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FM 44-2

DEPARTMENT OF THE ARMY FIELD MANUAL

AIR DEFENSE ARTILLERY EMPLOYMENT

(AUTOMATIC WEAPONS)

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HEADQUARTERS, DEPARTMENT OF THE ARMY
JUNE 1966

AGO/7298

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CHANGE
No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C. *19 May 1967*

AIR DEFENSE ARTILLERY EMPLOYMENT (AUTOMATIC WEAPONS) M42/M55

FM 44–2, 22 June 1966, is changed as follows:

1. Remove old pages and insert new pages as indicated below:

Remove page	Insert page
5 through 7	5 through 7
17 through 22	17 through 22
95 and 96	95 through 96

2. The following changes will be made in pen and ink:

Cover and Page 1. Add to title (beneath Automatic Weapons)) "M42/M55".

Page 29, paragraph 36*c*. In line 9, "500 meters" is changed to read "480 meters".

Page 33, table 1. Note 1 is changed to read, "1. Maximum mutual support distance: 1100 meters."

Page 56, paragraph 68*b*. In line 4, "500 meters" is changed to read "480 meters".

Page 78, figure 38. In legend, "Air Defense Control Net (FM)" and "Early Warning Net (FM)" are changed to read "Air Defense Control Net (AM)" and "Early Warning Net (AM)".

3. Paragraphs that have been added or changed are indicated by a star.

4. This transmittal sheet should be filed in the front of the manual for reference purposes.

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12–11 for Light Antiaircraft Artillery (Auto Wpns).

☆U.S. GOVERNMENT PRINTING OFFICE: 1967—250–512/7872A

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(3) *Minimum midpoint tracking range.* This is the shortest midpoint range at which the weapon can track a target. It is dependent upon target speed and the maximum angular tracking rate of the gun mount.

b. 40MM M42 Description and Characteristics.

(1) *Ammunition.* The M42 automatic weapon uses high explosive-tracer (HE-T), high explosive incendiary-tracer (HEI-T), and armor piercing-tracer (AP-T) ammunition. A super-sensitive fuze in the high explosive projectiles causes the shell to burst on contact. If no contact is made, the tracer element will burn out between 3,480 and 3,930 meters. A relay ignition charge in the HE-T round will cause self-destruction of the projectile. The AP-T round has no fuze; its maximum horizontal range is 8,664 meters.

★(2) *Mobility.* The 40mm gun motor carriage M42 (fig. 1) has two 40mm guns mounted coaxially on a full-tracked, lightly armored vehicle. It has the following characteristics:

(*a*)	Weight (with crew and equipment).	49,500 lb
(*b*)	Allowable speed	70 kph (45 mph)
(*c*)	Cruising range, average.	160 km (100 mi)
(*d*)	Maximum grade ability.	60%
(*e*)	Length	6.36 m
(*f*)	Width	3.23 m
(*g*)	Height	2.85 m

★(3) *Weapon characteristics.* The M42 automatic weapon may be fired either fully automatic or semiautomatic. Maximum rate of fire is 120 rounds per minute per barrel. The weapon is aircooled and, if fired continuously at

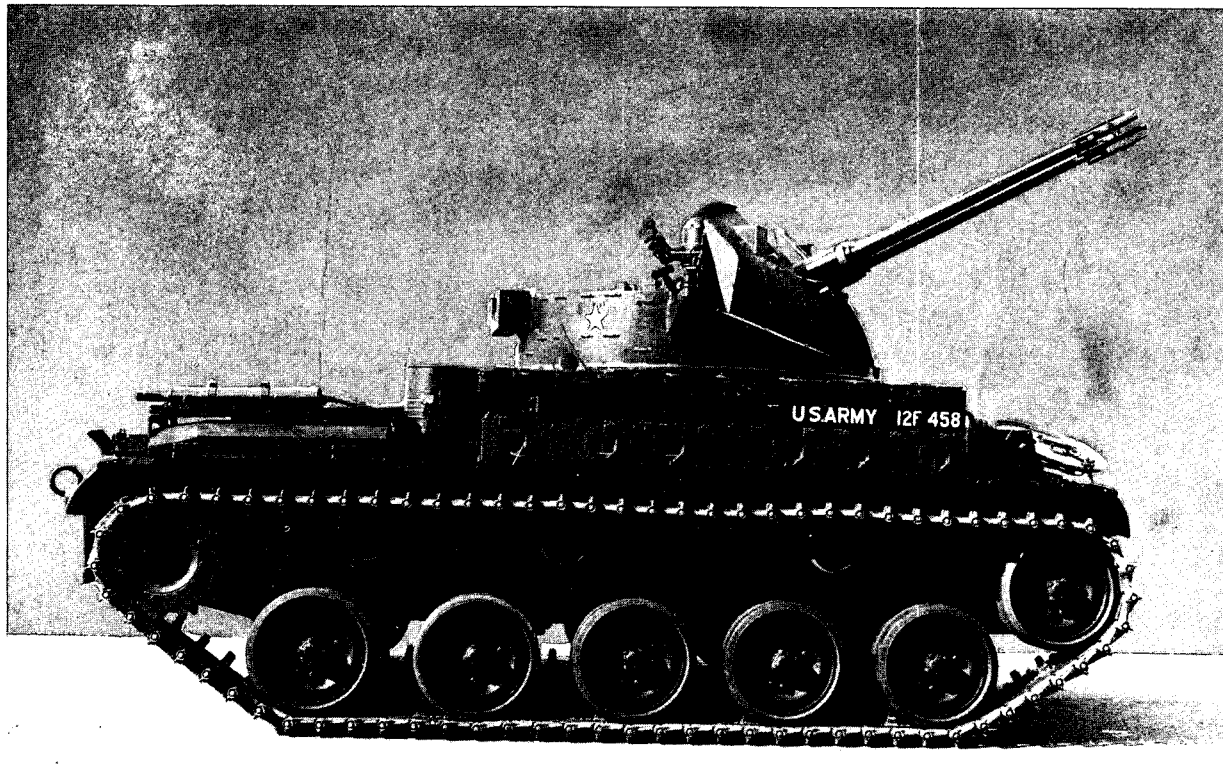

Figure 1. 40mm gun motor carriage, M42.

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the maximum rate, will overheat after approximately 100 rounds per barrel have been fired. Firing must then be suspended and the barrel changed, which takes approximately 3 minutes. Other characteristics are—

(*a*)	Maximum effective range.	1650 m
(*b*)	Traverse limits	360° (6400m)
(*c*)	Elevation limits	
	Power operation	−3° (53m) to 85° (151.1m)
	Manual operation	−5° (89m) to 87° (154.7m)
(*d*)	Elevation slew rate	25°/sec (444m/sec)
(*e*)	Azimuth slew rate	40°/sec (711m/sec)
(*f*)	Estimated accuracy life of tube.	12,000 rds
(*g*)	Maximum fording depth.	1 m

(4) *Fire control devices.* The primary fire control system is the 40mm computing sight, M38 and reflex sight, M24C. The secondary means of fire control is two speed ring sights.

★(5) *Machinegun M60.* The 7.62mm machinegun M60 is mounted on the right front of the turret. Its characteristics are—

(*a*)	Weight	23.16 lb
(*b*)	Length	43.50 in (overall)
(*c*)	Range (maximum)	3200 m
(*d*)	Rate of fire	550 rds/min (approx)
(*e*)	Capacity of magazine.	100 rds

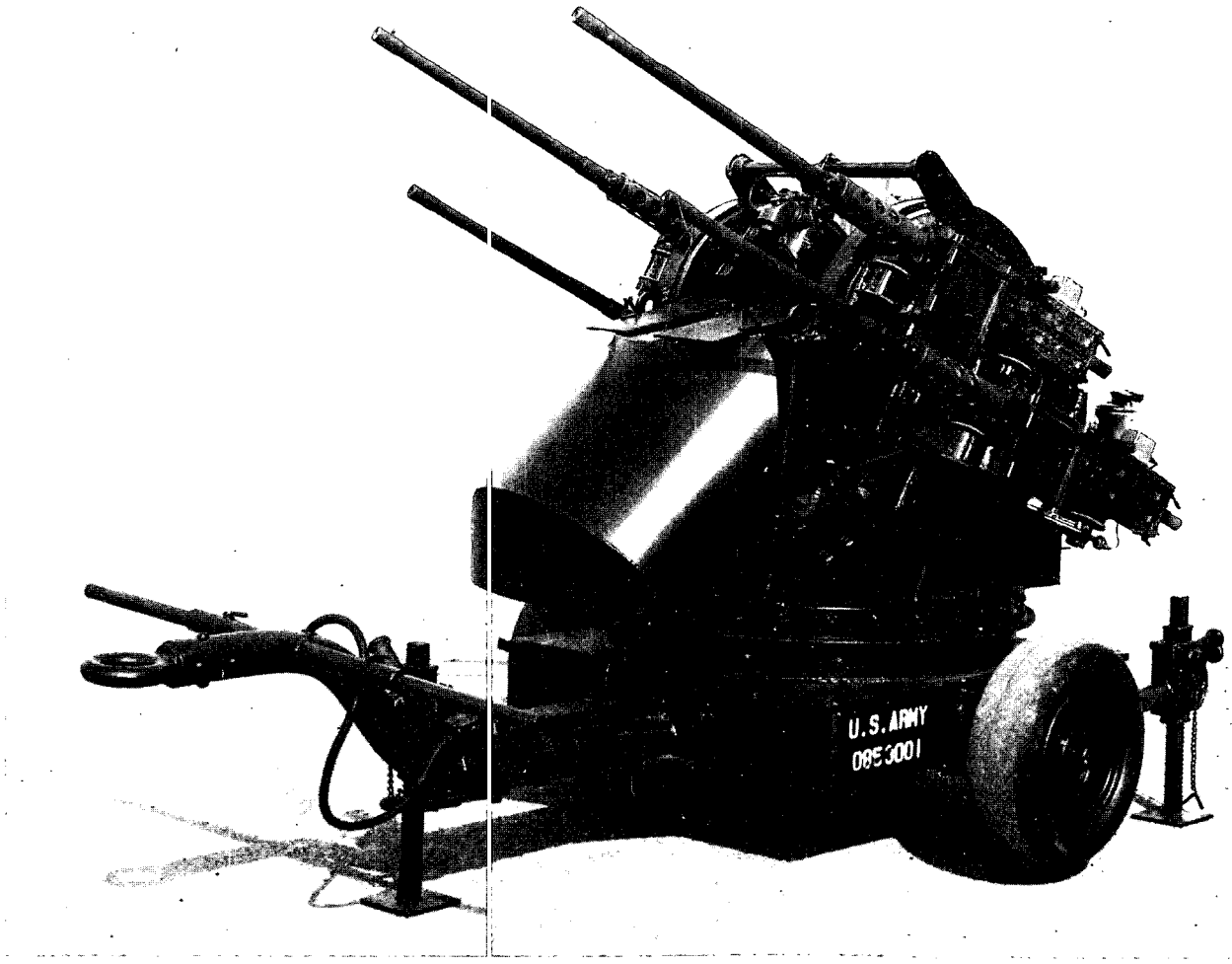

Figure 2. Multiple caliber .50 machinegun mount, M55.

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★*c. Multiple Caliber .50 Machinegun Trailer Mount M55.*

(1) *Ammunition.* The M55 uses armor piercing incendiary (API) and armor piercing incendiary-tracer (API-T). The tracer element of the caliber .50 ammunition burns out at ranges between 1,400 and 2,200 meters.

(2) *Mobility.* The M55 consists of the gun mount, M45C mounted on the two-wheeled M20 trailer. It may be moved short distances by manpower or towed in an emergency by any vehicle with a pintle tow hook. Maximum towing speed is 16kph (10 mph) over improved roads or 8 kph (5 mph) cross country. For moves other than very short distances, the M55 is normally transported on a 2½ ton, 6 x 6 truck equipped with special loading and mounting equipment. The weapon may be fired when mounted on this vehicle. The M55 may also be transported by medium helicopters and several types of troop and cargo carrying aircraft.

(3) *Weapon characteristics.* The standard mount for the M55 is an electrically operated, quadruple gun mount (fig. 2).

(*a*)	Maximum effective range.	725 m
(*b*)	Traverse	360° (6400m)
(*c*)	Maximum elevation	90° (1600m)
(*d*)	Rate of fire	450–555 rds/min/barrel
(*e*)	Azimuth and elevation slew rates.	0–60°/sec (1067 /sec)
(*f*)	Weight	2,950 lbs

(4) *Fire control device.* The M55 uses the M18 reflex sight for fire control. The M18 reflex sight is a speed ring type sight.

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CHAPTER 3
COMMAND AND CONTROL

Section 1. COMMAND RESPONSIBILITIES

16. General

FM 44–1 presents the principles of command and control of theater air defense operations, and a detailed listing of Army air defense officer functions at all levels.

★17. Theater Commander

Air defense resources are allocated to a theater by the Joint Chiefs of Staff, based on the theater commander's recommendations. The theater commander exercises operational command of all theater air defense forces through the area air defense commander, and, assuming the normal assignment and delegation of air defense responsibilities has occurred, through the Army component commander (para 18). Air defense functions of the theater commander include—

a. Establishing the theater priorities for air defense.

b. Approving the allocations of air defense resources for defense of the theater priorities.

c. Designating a single commander for theater air defense. This commander is the area air defense commander with the total theater area usually being subdivided into air defense regions.

18. Army Component Commander

a. The Army component commander assigns, organizes, and employs Army air defense resources made available in accordance with the theater commander's operational priorities and plans.

★*b.* ADA AW battalions and batteries required for defense of field army forces and installations normally are assigned to the field armies for further attachment within the field armies. ADA AW elements are commanded by the unit to which assigned or attached, subject to compliance with the theater air defense rules and procedures (para 19).

★*c.* ADA battalions and batteries required for defense of theater-designated target areas other than the field army area, normally are placed under the operational control of regional air defense commanders (para 19). The Army component commander can exercise command, less operational control, of these units through the creation of a theater army air defense command (TAADC) if warranted by the size of the air defense forces and the nature of the tasks involved; or, he may exercise his command functions directly through his air defense staff or indirectly through the senior nonfield Army ADA headquarters.

19. Area and Regional Air Defense Commanders

a. The area air defense commander (para 17*c*) is responsible for coordination and integration of the entire theater air defense effort. Subject to the authority of the theater commander, he will promulgate the broad policies and procedures for the employment and coordination of the theater air defense means.

★*b.* The area air defense commander, in the exercise of his responsibility for coordination and integration of the entire theater air defense effort, establishes air defense regions. The regional AD commanders are fully responsible for and will have full authority in the air defense of their regions. They will, however, normally delegate authority to the field army commander (para 20) for "control and operational employment" of ADA resources assigned to the field armies. The term "control and operational employment" is interpreted to mean a degree of authority less than that of opera-

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tional control. As interpreted and used in this manual, it means operational control, subject to observance of specific air defense rules and procedures established by the regional air defense commander who delegated the "control and operational employment" authority. These control items are discussed further in paragraph 27.

★*c.* The regional air defense commander normally retains operational control of ADA AW battalions and batteries deployed in defense of targets other than field army targets; e.g., airbase or vital COMMZ targets.

20. Field Army and Corps Commanders

a. ADA AW battalions and batteries required for defense of designated vital areas in the army service area are retained at field army level under the command of the field army air defense organization (normally an ADA brigade). ADA AW units are also attached to the corps, for attachment to the corps air defense organization (normally an ADA group). The corps may further attach ADA AW units to the divisions as required.

★*b.* ADA AW units are responsive to the air defense needs of the command to which assigned or attached, subject to compliance with the theater air defense rules and procedures (para 19).

21. Division Commanders

a. Division organization for combat is the prerogative of the division commander. The ADA AW unit (normally a battalion-size unit) normally is retained under division control.

b. The normal ADA AW unit organization for combat for air defense of the division priority installations and units places all units in a battalion-size ADA organization directly responsive through the ADA commander to the division commander. This does not preclude *attachments for rations,* or other similar *limited attachments,* of the forward ADA elements to other divisional elements when appropriate. ADA AW units assigned an air defense mission are attached to subordinate divisional elements only to the extent required for the successful accomplishment of their mission.

c. Detailed attachment of AW elements is normal for units assigned a ground mission (further discussed in para 25).

d. An ADA AW unit assignment or attachment order must be explicit in terms of functions to be performed by the gaining commander, and functions to be retained in ADA organization channels. A typical breakout of functions is as follows:

★(1) Gaining commander—operational control.

(2) ADA parent organization.

(*a*) Control *air defense* fires (para 27), in response to the requirements of the theater air defense system.

(*b*) Furnish agreed portions of the organization's administrative/logistic capability to units which are to be further attached.

(*c*) Provide advice regarding allocations, capabilities, administrative, and logistics.

(*d*) Manage personnel transfers and promotions.

22. ADA AW Unit Commanders

a. When an ADA AW unit is assigned or attached to another unit for defense of that unit, the senior ADA AW commander is a subordinate commander to the gaining unit commander. An exception, which does not affect command responsibilities and prerogatives, is that ADA AW commanders receive orders regarding control of air defense fires (para 21*d* (2) and para 27) via *air defense* channels. These orders may be received directly from the parent ADA organization, or indirectly through the unit to which attached. The former method is preferred when assigned an air defense mission to take advantage of the established quick reacting air defense nets.

b. An ADA AW commander's responsibilities to those unit firing elements which have been further assigned or attached to other units are as outlined in paragraph 21*d*(2). An ADA AW commander who has all firing elements further attached will position his command post to best advise and assist the headquarters to which his headquarters is assigned or attached, will maintain any radar surveillance capability, and will plan for changes in mission and command arrangements.

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Section II. CONTROL MEASURES

23. General

Key control elements include control of unit allocations, mission assignment, control of maneuver, and control of fires. Control is exercised through dissemination of detailed unit SOP based on theater air defense policies and procedures, and by provision of liaison and communications as discussed in paragraph 28.

24. Control of Allocations

Allocations of ADA AW units are made in accordance with established priority lists for air defense as discussed in paragraphs 17 through 21. A commander receiving an allocation of these units may suballocate them as necessary to accomplish his mission. Any limitations placed on the receiving commander must be defined in the terms of attachment or assignment.

25. Mission Assignment

a. An ADA AW unit assignment attachment carries with it a mission to provide air defense of or for the force, unless specified otherwise. A force receiving an ADA AW unit allocation further assigns missions of defense of specified vital areas or force elements, subject only to limitations which may be included in the assignment or attachment order. Because the air defense means made available are generally limited, the force commander should prescribe priorities for air defense of his force units or installations. Assignment of ground support missions normally will be advisable only in a low air threat environment, except that a commander's right of self defense with all available weapons is never denied.

b. An ADA AW squad is assigned either an air defense or a ground support mission; never both simultaneously. Distinct mission assignment is necessary due to the differing deployment, and control concepts for accomplishment of the air defense and ground support mission. This does not preclude all feasible integration of the ADA AW capability into the local ground security plan of the unit to which attached, under either mission. Nor does it preclude self defense against either ground or air attack.

26. Control of Maneuver

The ADA AW commander maneuvers his units as necessary to defend or support the forces to which assigned or attached. Coordination requirements often will be imposed by higher echelons, especially in nonfield army ADA AW organizations.

27. Control of ADA AW Fires

a. Concepts.

(1) The right of self defense against air and ground attack is never denied.

(2) ADA AW squads during wartime normally make *air defense* engagement decisions based on the SOP that aircraft *positively* identified as hostile will be engaged. This rule may be changed infrequently by higher echelons to allow relatively unrestricted engagement or to impose increased fire restrictions. This concept for control of fires is dependent upon provision of a clear and detailed air defense SOP covering the items discussed in *b* through *h* below, and communications to allow higher echelons to modify the air defense SOP if the situation demands.

(3) ADA AW units assigned a ground support mission deliver surface-to-surface fires in accord with the force commander's decisions.

★*b. Theater Alert System.*

(1) *Conditions of readiness.* Conditions of readiness are the means used by specific authorities to maintain the theater air defenses at a state of preparedness compatible with the real or apparent imminence of attack. The terms defense readiness condition (DEFCON) and defense readiness posture (DEFREP) are frequently used in relation to conditions of readiness. In response to each condition of readiness, the Army air defense commander prescribes a required state of alert for each ADA unit under his command.

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(2) *Air defense warning.* Air defense warnings are normally issued after air defense units have reached their highest conditions of readiness, and represent the air defense commander's evaluation of the probability of air attack. Typical warnings include: RED, attack imminent or in progress; YELLOW, attack probable; and WHITE, attack not probable. The conditions of readiness ((1) above) and the air defense warnings serve as a basis for implementation of the air defense rules and procedures of the regional air defense commanders. These rules for engagement and procedures are established in operations orders or SOP.

c. Rules for Engagement.

(1) Rules for engagement are promulgated by the area air defense commander in order to define, as a minimum, the responsibilities, procedures, and criteria for aircraft identification and engagement in consonance with the theater alert system.

(2) Following are rules for engagement considered typical for ADA AW operations:

(*a*) *Conditions short of war.* Engagements are conducted only in self defense or as ordered by designated AD commanders.

(*b*) *Wartime.* Engagements are conducted in accord with the prevailing weapon control status (*d* below) and the hostile criteria (*e* below).

(3) Implementation of the rules by ADA AW squads requires that visual determination be made of the friendly or hostile character of each aircraft; therefore, the rules are based on use of detailed visual identification criteria. Visual identification is discussed further in *i* below.

d. ADA Weapon Control. Each ADA weapon control status indicates the degree of air defense fire restriction imposed upon the ADA AW squad. A "normal" wartime status for ADA AW should be specified in the rules for engagement. Authority to change ADA weapon control status, if any, should also be specified. The ADA weapon control status terms defined and discussed below may be combined to give, aircraft and less freedom to fire at helicopters. for example, more freedom to fire at fixed wing aircraft and less freedom to fire at helicopters.

(1) *Weapon free.* Fire at any aircraft not identified as friendly. Under this status, "unknowns" may be engaged.

(2) *Weapon tight. Fire only at aircraft positively identified as hostile. This should be the normal ADA weapon control status for ADA AW squads in wartime.* Theater rules for engagement will specify exact criteria for declaring an aircraft hostile when operating under this status. Examples of hostile criteria are presented in *e* below.

★(3) *Hold fire.* Do not fire. This term, as defined in Army regulations, should not impose a blanket restriction on an entire area and all flights therein but only on certain indicated flights. Due to the difficulty of transmitting accurate flight information to ADA AW squads, it may be necessary to have this ADA weapon control status apply to ADA AW squads within a designated area in terms of time, and basic aircraft type (for example: hold fire 1400–1430 hours, rotary wing; or, hold fire 1400–1430 hours, F–105 strike). This status should only be invoked if safeguards over and above those inherent in the "normal" weapon tight status are required.

e. Hostile Criteria. (Example.) The theater rules for engagement will define criteria by which an aircraft may be designated hostile. For example, SOP may classify as hostile, aircraft which are—

(1) Attacking friendly elements.

(2) Spraying or smoking friendly elements without prior coordination.

(3) Dropping flares at night over friendly territory without prior coordination.

(4) Discharging parachutists or unloading troops in numbers in excess of the

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normal aircraft crew without prior coordination.

(5) Engaging in mine-laying operations without prior coordination.

(6) Improper or unauthorized entry into an area designated as restricted.

(7) Dropping ECM devices, e.g., chaff and reflectors, over friendly territory without prior coordination.

(8) Bearing the military insignia or having the configuration of an aircraft employed by a known enemy nation.

★*f. Method of Control.*

(1) *General.* Theater rules or unit SOP may specify or imply the required ADA method of control.

(2) *Centralized.* Under the centralized method of control, an air defense commander may require that fire units only conduct engagements upon receipt of specific orders or permission from a designated higher air defense echelon. This method is not appropriate for most ADA AW operations during wartime.

(3) *Decentralized.* Under the decentralized method of control, engagement decisions are made at the ADA AW squad level, based on the rules for engagement and subject to any temporary engagement restrictions imposed by higher echelons. This is the normal wartime method for control of ADA AW squads conducting air defense missions.

g. Fire Distribution. Fire distribution in an ADA AW defense is achieved through proper defense design and is further insured by an SOP which requires the ADA AW defense commander to assign each ADA AW squad a primary sector of fire. Targets appearing in the primary sector receive priority over those in secondary sectors of fire. As a general rule, the target in the primary sector that is most threatening, i.e., the one that will apparently arrive first, will be engaged first. As many automatic weapons as possible should be brought to bear on every target unless ammunition is very limited.

★*h. Firing Techniques.*

(1) ADA AW squad normally should engage an aerial target with continuous fire until the target is destroyed or out of range. When tracer density in a multiple ADA AW defense precludes tracer sensing, fire should be placed well in front of the aircraft so that the aircraft is forced to fly into or through the air defense fires.

(2) ADA AW squads engage surface targets with continuous fire or short bursts, as appropriate.

i. Visual Identification. ADA AW operations under the recommended control concept involve *visual* aircraft recognition by the ADA AW gunner and/or squad leader. It is essential that all ADA AW unit weapon crew personnel be well trained in visual aircraft recognition. Use of flights by friendly aircraft common to the theater in which the ADA AW units are employed should be an integral part of field recognition training.

28. Coordination of Operations

a. General. ADA AW operations must be coordinated with the defended or supported unit force and the area air defense system. Coordination is accomplished through use of liaison personnel and communications. Coordination is enhanced through collocation of command posts whenever feasible.

b. Liaison. Liaison requirements vary with force organization. As a general rule, ADA AW battalions, batteries, and platoons should establish personnel liaison with the force to which assigned or attached whenever the force and ADA command posts are not collocated. ADA AW liaison personnel usualy operate in the force operations center and are responsible that the force commander and staff understand ADA AW tactics, techniques, and employment and that the ADA AW commander represented is kept abreast of changes in air defense requirements and the ground tactical situation.

★*c. Communications.* Communications are also required for rapid receipt of changes to the air defense SOP for control of fires (para 27). These latter communications follow air defense channels and eventually terminate in a designated area air defense operations cen-

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ter. Lower echelon ADA AW elements, when assigned or attached to other units, may find it necessary to establish a portion of the required control of air defense fires link through the communications network of the unit to which assigned or attached. However, communications for coordination or control of fires through ADA channels are preferred.

Section III. TYPE COMMAND ARRANGEMENTS

29. General

ADA AW command arrangements are tailored to each force organization and situation. Figures 8 through 10 depict several "type" structures, which are discussed in the following paragraphs. These figures represent only three of the many possible solutions to the problems of command and air defense control.

30. ADA AW Assigned to the Field Army

★*a.* Figure 8 depicts a type allocation and command arrangement for ADA AW units assigned to a field army for conduct of air defense missions. Command is exercised by the force to which assigned or attached, subject to compliance with the theater air defense rules and procedures.

b. The type ADA AW unit allocation depicted provides nine M42 battalions and six M55 batteries to the type field army. Although some of this capability could be retained under the field army air defense brigade for purposes of complementing Nike Hercules and Hawk defenses of field army vital areas in the army service area, figure 8 shows all the ADA AW units further attached.

c. The M42 battalions are shown further attached to the divisions. M55 batteries may also be attached to the divisions, but in figure 8 these are retained at corps level for use as required; e.g., for close-in defense of surface-to-air missile sites.

d. Although the M42 battalion normally accomplishes the divisional air defense mission without further attaching M42 batteries and platoons to divisional elements, figure 8 shows one M42 battery further attached to each brigade for brigade air defense during an assumed maneuver. One M42 battery is retained under direct M42 battalion control for air defense of other division priority targets; e.g., the nuclear delivery means.

e. An ADA AW battalion assigned a ground support mission will organize for combat to best accomplish this mission. This may be by attaching individual firing elements to designated divisional elements or by supporting the division as a whole as a battalion. The former method is normal.

31. ADA AW in COMMZ Defenses

Figure 9 depicts a type weapon allocation and command arrangements for ADA AW units retained under the operational command of the regional air defense commander for defense of critical theater installations. Depending on the defense requirements of the various vital area, "defense commanders" could be interposed at any point in figure 9. These commanders would be directly responsive to the regional air de-

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★132. Basic Concepts

a. The primary mission of the ADA AW unit assigned a ground support role is to provide fire as directed by the supported force commander.

★*b.* The ADA AW unit's mobility and communications enable it to be displaced rapidly in response to changing tactical situations. If AD fire from the ground support positions is not feasible, supplementary air defense positions in the vicinity of the ground support positions should be selected and occupied in the event of air attack.

c. Use of direct fire is normal; however, indirect fire may be used as necessary.

d. Mutual support between fire units and massing of fires should be sought.

e. The platoon is the basic ADA AW element employed in the ground support role. When employed in this manner, the platoon may be augmented by a portion of the ADA AW battalion combat service support capability. The augmented platoon is then attached to the supported force; e.g., an infantry battalion.

f. ADA AW sections, squads, or tailored organizations of less than platoon size may be further attached to subordinate elements of the supported force. These units are dependent upon elements of the augmented platoon and the supported force for combat service support.

g. ADA AW commanders whose ADA AW squads have been attached to other units perform advisory, support, and planning functions as outlined in paragraph 21.

133. Capabilities and Limitations

a. M42 ADA AW squads are capable of delivering a high volume of accurate direct fire against enemy personnel, lightly armored vehicles, bunkers, observation posts, crew-served weapons, and similar targets. Indirect fire also may be used, although it is less effective and is worthwhile only in a rather narrow range of circumstances. Specific capabilities are presented in paragraph 4.

b. Limitations of the M42 ADA AW in the ground support role include its high silhouette, lack of overhead crew protection and ineffectiveness against heavily armored vehicles. Due to these limitations, M42 ADA AW must not be employed in a tank role or as a self-propelled antitank weapon.

★134. Mission

When the ground threat exceeds the air threat or as the force commander elects, the force commander may elect to exploit the mobility and firepower of M42 ADA AW by assigning them a ground support role. They are best suited for defensive operations and are best used to augment the firepower of infantry elements opposing infantry elements. See paragraphs 3 and 5 for further discussions of ADA AW missions.

135. Organization for Combat

a. The ADA AW unit normally is attached to a combat unit when assigned a ground support role. A typical attachment is the ADA AW platoon (8 AW squads) attached to an infantry battalion. The supported battalion commander may then further attach ADA AW sections to his companies, or assign some ADA AW elements the mission of providing local security or air defense for the battalion reserve until the reserve is committed. In any arrangement, the ADA AW platoon commander is the principal advisor to the supported unit commander regarding the technical and tactical capabilities of the weapon. He must remain abreast of combat operations and the performance of his sections and squads.

b. The ADA AW platoon organization for performance of the ground support role is tailored to consist of the basic platoon (para 11), augmented by a portion of the ADA AW battalion and/or battery combat service support capability as discussed in chapter 8. Combat service support responsibilities of the attached ADA AW unit, the supported unit, and the parent ADA organizations must be specified in the attachment order.

136. Duties of Key Personnel

a. Platoon Leader. The platoon leader is responsible for the platoon's training, employment, and combat service support. He receives

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his orders from the commander of the unit to which attached; e.g., an infantry battalion commander. He makes recommendations for the employment of his platoon. He selects and directs the preparation of firing positions and areas for any elements of his platoon which are not further attached to subordinate elements of the supported unit. He is considered a special staff officer under the supported unit's S3 staff supervision. The platoon leader normally remains with the supported force headquarters as the ADA AW special staff officer.

b. Assistant Platoon Leader. The assistant platoon leader is second in command and assumes command of the platoon in the absence of the platoon leader. He may provide the platoon liaison with the supported force when the platoon is deployed as a whole, or may be designated to command ADA AW sections or squads further attached to subordinate elements of the supported unit.

c. Platoon Sergeant. The platoon sergeant assumes command of the platoon in the absence of the platoon and assistant platoon leaders. He supervises the platoon transportation and resupply of ammunition and supplies. He may be designated to accompany a portion of the platoon on a mission in order to assist the squad leaders in matters of fire control and coordination with supported units. He may also command specified ADA AW sections and squads which have been further attached.

137. Communications

a. General. Chapter 7 describes basic communications nets.

b. Radio Communications.

(1) The vehicular radio mounted in the platoon leader's ¼-ton truck permits the platoon leader to operate in the ADA AW platoon command net and in another designated net, normally the command net, of the supported unit.

(2) The vehicular radio mounted in the platoon headquarters ¾-ton truck (AN/GRC–106) permits operation in the air defense control net (para 99 and 108) to preclude burdening the supported units communications nets with routine ADA-peculiar administrative and logistic messages. Use of the air defense control net in this manner also keeps the ADA AW platoon abreast of the air defense situation.

(3) The ADA AW squad vehicular radio operates in the ADA AW platoon command net when the squad is operating under platoon tactical control. When the squad is attached directly to a maneuver element, it may operate in that element's command net or may be directed to receive orders via the artillery forward observer net. The squad receiver-only radio (AN/GRR–5) normally is tuned to the division warning net frequency, although it may be tuned to other AM nets when required or directed.

(4) The ADA AW section leader utilizes a selected squad's radio for receipt and transmission of section command and control information.

c. Wire Communications. Each ADA AW squad and the platoon headquarters has wire and telephones to establish communication through the nearest switchboard. In addition, the platoon headquarters has a switchboard which enables the platoon to establish its own wire net when necessary.

138. Reconnaissance, Selection, and Occupation of Position

Movement orders are received from the commander of the unit to which the ADA AW is attached. Upon receipt of these orders, the AD

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FIELD MANUAL
No. 44–2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *22 June 1966*

AIR DEFENSE ARTILLERY EMPLOYMENT (AUTOMATIC WEAPONS)

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* This manual supersedes FM 44–2, 12 July 1956.

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CHAPTER 1

INTRODUCTION

1. Purpose and Scope

a. This manual is a guide for air defense artillery automatic weapon (ADA AW) commanders at all echelons from battalion to squad, and for commanders and staffs responsible for the employment of these weapons. This manual discusses the employment of ADA AW units; the procedures to support them in various tactical situations; and the organization of ADA AW units.

b. The term air defense artillery automatic weapons (ADA AW) as used in this manual refers to the twin 40mm self-propelled gun, M42 and the multiple caliber .50 machinegun, M55 (referred to in this manual as the M42 and M55 weapon systems).

c. The material presented herein is applicable in nuclear and nonnuclear warfare.

2. Changes to Manual

Users of this manual are encouraged to submit recommended changes or comments to improve the manual. Comments should be specific in nature and keyed to specific pages and paragraphs. Justification for recommended changes should be provided to enable proper evaluation. Comments or recommended changes should be forwarded to: Commanding Officer, U.S. Army Combat Developments Command Air Defense Agency, ATTN: CAGAD–OD, Fort Bliss, Tex. 79916.

3. Mission of ADA AW

a. General. The mission of air defense artillery automatic weapons is to attack and destroy hostile airborne and surface targets. This mission encompasses a primary air defense role and a secondary ground support role. Commanders whose forces include ADA AW units assign the role, air defense or ground support, which best counters the greatest threat to the accomplishment of the overall force mission. Although ADA AW *units* (battalion, battery or platoon) may be assigned both roles simultaneously, individual *weapons* are assigned one or the other. Weapons should be sited best to accomplish the assigned role, with secondary consideration given to the other role. Commanders must keep in mind however that the primary role and justification for air defense artillery automatic weapons is defense against air attack. This is the role for which ADA AW units are best trained, organized, and equipped.

b. Air Defense.

(1) ADA AW units normally are employed to provide local air defense to ground combat and combat support units and installations in the forward area of the battle zone. (A defended unit or installation is one that is receiving air defense protection.) They may also be employed to provide air defense to surface-to-air missile (SAM) units and other critical combat support and combat service support units and installations in the field army area and communications zone. ADA AW units are capable of providing air defense for fixed and mobile installations against low flying enemy aircraft when these aircraft can be engaged by the visually directed weapons.

(2) ADA AW units normally are employed in an area with SAM units to offset the radar masking limitation of

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SAM units and the high altitude limitation of the automatic weapons. This employment principle denies a best attack option to the enemy. The ADA AW units thus assist in the attainment of attrition levels against enemy aircraft that in the long term may be unacceptable. Thus, they contribute to the attainment of local air superiority.

c. Ground Support. The force commander may elect to exploit the mobility and firepower of ADA AW by assigning them a ground support role. This role should be assigned only in the absence of an air threat or when air attack is highly unlikely. Before engaging in such a role, ADA AW commanders should consider tailoring the organization to best accomplish this role and, when the tactical situation permits, training personnel for the operation to be performed. Ground support missions of long duration may require further assistance from higher AD commanders and/or supported unit commanders.

(1) *Direct fire.* Although ADA AW are designed to provide air defense fires, when assigned the ground support role they are better suited for direct fire than indirect fire roles.

(2) *Indirect fire.* In certain situations, ADA AW may be required to deliver harassing, interdicting, or neutralizing fires from AD or direct fire support positions which preclude line of sight to targets.

d. Interrelationship. Assignment of one particular role (i.e., air defense or ground support) does not, in itself, preclude the delivery of AW fires in the other.

(1) *Local security.* Local security is a constant and inherent command responsibility. ADA AW ground fires are planned as a matter of local security regardless of the role assigned.

(2) *Self defense.* The right of self defense is never denied. ADA AW squads positioned in the air defense role fire upon attacking ground forces as necessary. Weapons positioned in the ground support role will engage these aircraft attacking the supported unit or the ADA weapons. (A supported unit is a unit which is provided ADA AW to support ground operations.)

(3) *March columns.* Except when no probable air threat exists, ADA AW operating in defense of a march column should be assigned the mission of air defense and positioned so as to facilitate air defense of the column. This does not preclude the column commander from diverting all or part of the ADA AW to a surface mission if required to defend against ground attack.

4. Characteristics and Capabilities

a. General. Air defense artillery automatic weapon units are capable of providing low altitude air defense against subsonic aircraft and may be employed against personnel and lightly armored vehicles. 40mm and caliber .50 ammunition must hit a target to be effective. Characteristics of these weapons enable gunners to track aircraft at a high angular rate and shift quickly from one target to another. Both weapons depend upon visual detection, identification, and tracking and are therefore affected by conditions of visibility. Pertinent range criteria are—

(1) *Extreme deterrent range.* The extreme deterrent range is the tracer burnout range of automatic weapon projectiles. At this range, the fire is inaccurate but, if delivered with maximum density, may cause enemy aircraft to take evasive action, break formation, or abandon their mission.

(2) *Maximum effective range.* The maximum effective range is the maximum distance within which the weapon can be expected to fire accurately and inflict casualties or damage. It is influenced by tracer observation, type of sighting device, lead tolerance, aircraft speed, angle of approach, and the state of gunner proficiency.

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(3) *Minimum midpoint tracking range.* This is the shortest midpoint range at which the weapon can track a target. It is dependent upon target speed and the maximum angular tracking rate of the gun mount.

b. 40mm M42 Description and Characteristics.

(1) *Ammunition.* The M42 automatic weapon uses high explosive-tracer (HE–T), high explosive incendiary-tracer (HEI–T), and armor piercing-tracer (AP–T) ammunition. A super-sensitive fuze in the high explosive projectiles causes the shell to burst on contact. If no contact is made, the tracer element will burn out between 3,500 and 4,760 meters, depending on the type of projectile. A relay ignition charge in the HE–T round will cause self-destruction of the projectile. The AP–T round has no fuze; its maximum horizontal range is 8,780 meters.

(2) *Mobility.* The 40mm gun motor carriage M42 (fig. 1) has two 40mm guns mounted coaxially on a full-tracked, armored vehicle. It has the following characteristics:

(*a*) Weight (with crew and equipment). 49,500 lb
(*b*) Allowable speed ---------70 kph (45 mph)
(*c*) Cruising range, average -160 km (100 mi)
(*d*) Maximum grade ability -60%
(*e*) Length ----------6.36 m
(*f*) Width ----------3.23 m
(*g*) Height ----------2.85 m

(3) *Weapon characteristics.* The M42 automatic weapon may be fired either fully automatic or semiautomatic. Maximum rate of fire is 120 rounds per minute per barrel. The weapon is

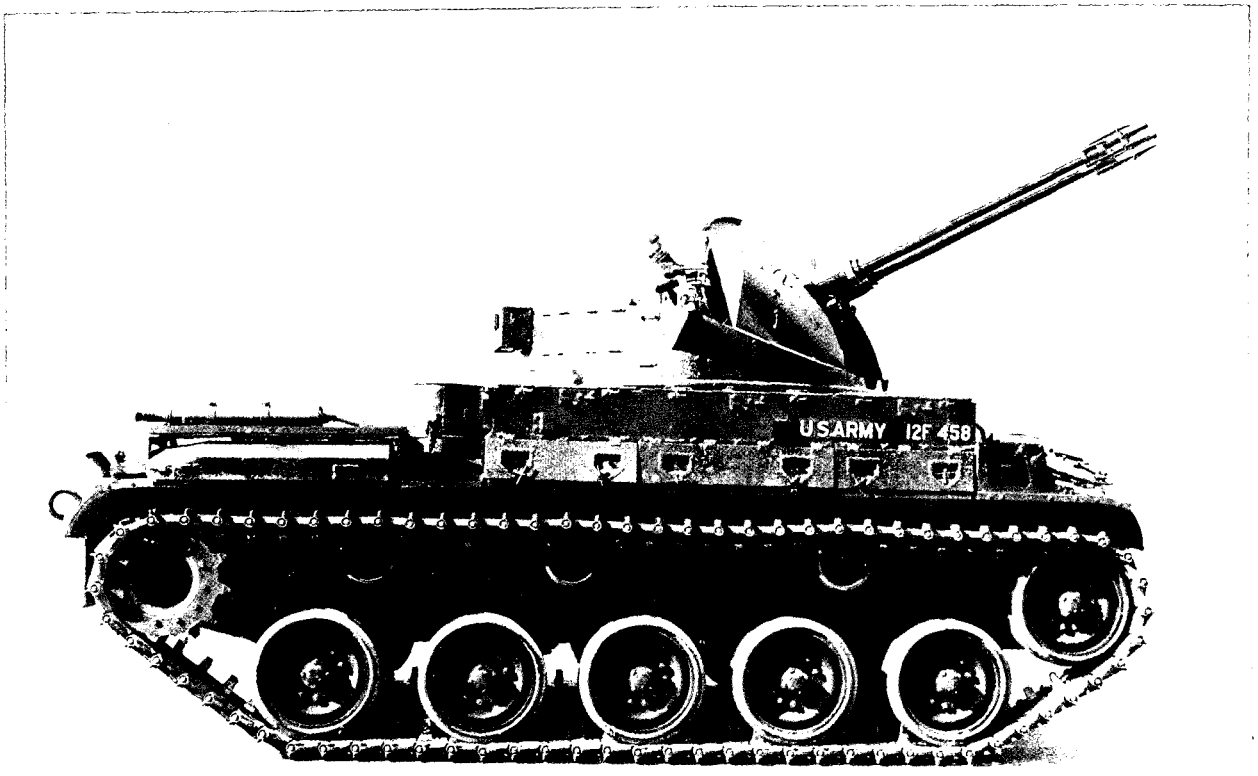

Figure 1. 40mm gun motor carriage, M42.

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aircooled and, if fired continuously at the maximum rate, will overheat after approximately 100 rounds per barrel have been fired. Firing must then be suspended and the barrel changed, which takes approximately 3 minutes. Other characteristics are—

(*a*)	Maximum effective range.	1650 m
(*b*)	Traverse limits	360° (6400 ‰)
(*c*)	Elevation (power/manual) limits.	85°/87° (1511/1547 ‰)
(*d*)	Elevation slew rate	25°/sec (444 ‰/sec)
(*e*)	Azimuth slew rate	40°/sec (711 ‰/sec)
(*f*)	Estimated accuracy life of tube.	12,000 rds
(*g*)	Maximum fording depth.	1 m

(4) *Fire control devices.* The primary fire control system is the 40mm computing sight, M38 and reflex sight, M24C. The secondary means of fire control is two speed ring sights.

c Multiple Caliber .50 Machinegun, M55.

(1) *Ammunition.* The M55 machinegun uses armor piercing incendiary (API) and armor piercing incendiary-tracer (API–T). The tracer element of the caliber .50 ammunition burns out at ranges between 1,400 and 2,200 meters.

(2) *Mobility.* The M55 machinegun consists of the gun mount, M45C mounted

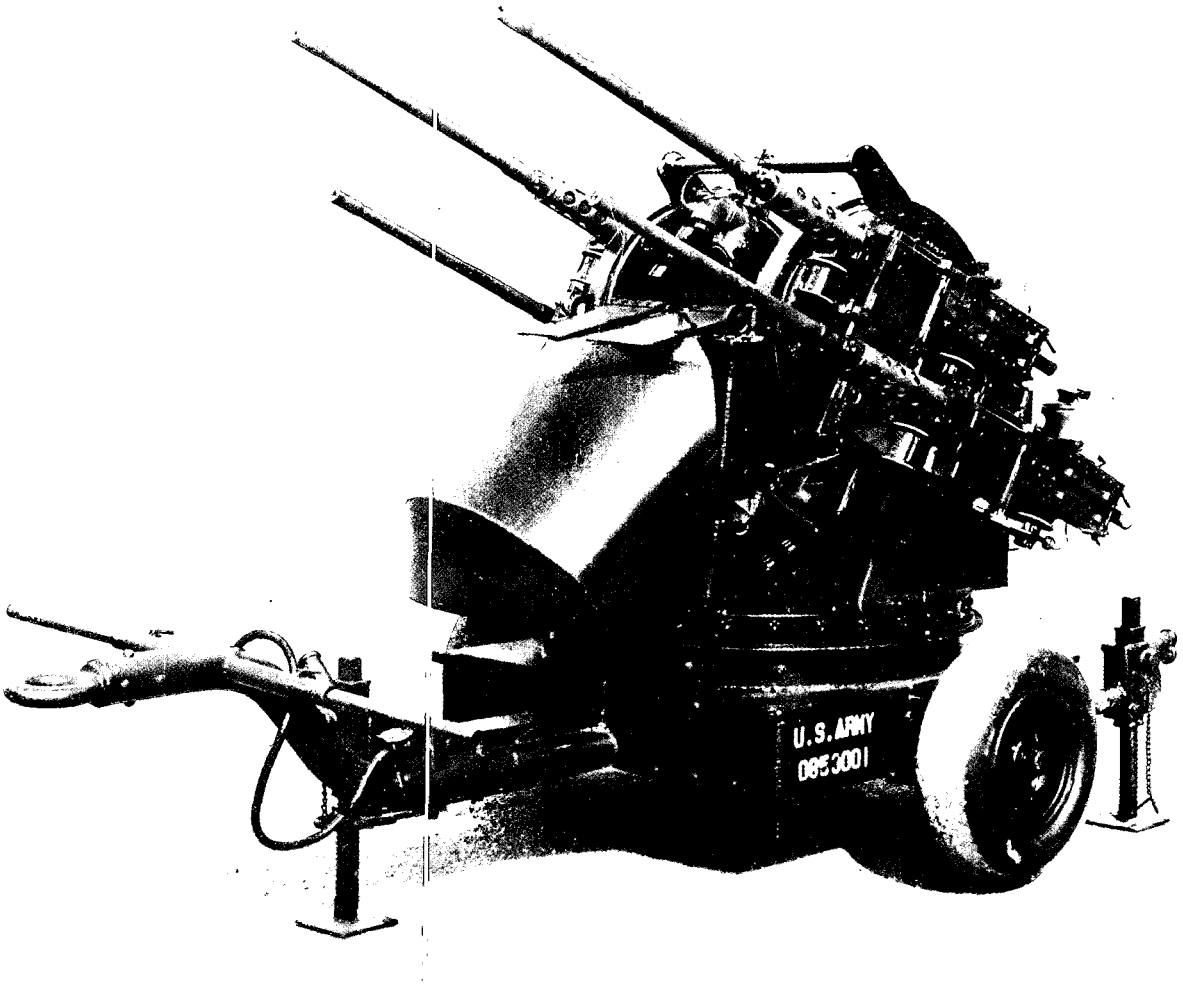

Figure 2. Multiple caliber .50 machinegun mount, M55.

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on the two-wheeled M20 trailer. It may be moved short distances by manpower or towed in an emergency by any vehicle with a pintle tow hook. Maximum towing speed is 16 kph (10 mph) over improved roads or 8 kph (5 mph) cross country. For moves other than very short distances, the M55 is normally transported on a 2½ ton, 6x6 truck equipped with special loading and mounting equipment. The weapon may be fired when mounted on this vehicle. The M55 may also be transported by medium helicopters and several types of troop and cargo carrying aircraft.

(3) *Weapon characteristics.* The standard mount for the M55 is an electrically operated, quadruple gun mount (fig. 2).

(*a*)	Maximum effective range.	725 m
(*b*)	Traverse	360° (6400 ~~m~~)
(*c*)	Maximum elevation.	90° (1600 ~~m~~)
(*d*)	Rate of fire	450–555 rds/min/barrel
(*e*)	Azimuth and elevation slew rates.	0–60°/sec (1067 ~~m~~/sec)
(*f*)	Weight	2,950 lbs

(4) *Fire control device.* The M45C caliber .50 multiple machinegun uses the M18 speed ring sight for fire control (see fig. 59).

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CHAPTER 2

ORGANIZATION

Section I. ORGANIZATION OF THE ADA AW BATTALION, SP (M42)

5. Introduction

a. General. Air defense artillery automatic weapons units are allocated to oversea theaters as M42 battalions or M55 batteries and assigned or attached at army, corps, or division level as required. Fragmentation of the battalion by further attachment of subordinate elements is based on operational requirements and the threat. ADA AW units are organized primarily to accomplish the air defense mission. Both the M42 and M55 are also capable of delivering ground fire upon soft surface targets. They are both capable of rapid redeployment, although to a lesser extent for the M55, due to its dependency upon the 2½ ton truck for mobility. The operational flexibility of the M42 enhances employment in either its primary or secondary role throughout the operational area. However, neither the M42 nor the M55 TOEs are specifically designed to support employment in the ground role and because elements are normally attached to the supported unit when assigned this role, some pre-tailoring of the unit may be necessary and arrangement made for their combat service support. The nature of the air defense mission and the characteristics of the weapons impose a requirement that weapon squads be capable of engaging aircraft from dispersed locations often independent of parent AD unit engagement control. These squads are not logistically self-sufficient and should not be detached from parent AD units unless provision is made for their support by other means.

b. M42 Battalion. The M42 battalion is organized to facilitate employment as a unit in providing air defense for division priority units/installations or other important installations. The four firing batteries, each containing 16 weapons (squads), are self-contained administratively and tactically and can operate independently when required. Employment by platoon (8 weapons) or by section (2 weapons) is possible providing detailed arrangements are made for combat service support.

c. M55 Battery (para 11–15). The M55 battery is organized to provide local air defense of units or installations against low-flying aircraft. The unit can provide mobile fire against such aircraft from unprepared positions. Since the prime mover for the M55 is the 2½ ton truck, positioning of the weapon is generally restricted to sites accessible by this vehicle. When helicopter transportation is available, M55 units may be attached to an airmobile unit. The M55 battery depends upon any unit to which attached for administration, mess, medical, and all other combat service support functions. It is therefore not capable of independent operations. The M55 battery is not normally assigned a ground support role, but when the tactical situation dictates, the M55 can be very effective as a ground support weapon.

6. Battalion

The battalion is the basic tactical and administrative organization for M42 units. It consists of a headquarters and headquarters battery and four firing batteries (TOE 44–85). The headquarters and headquarters battery contains the necessary staff elements to provide the firing elements with operational, administrative, and logistical support in most situations (fig. 4). Firing batteries each consist of

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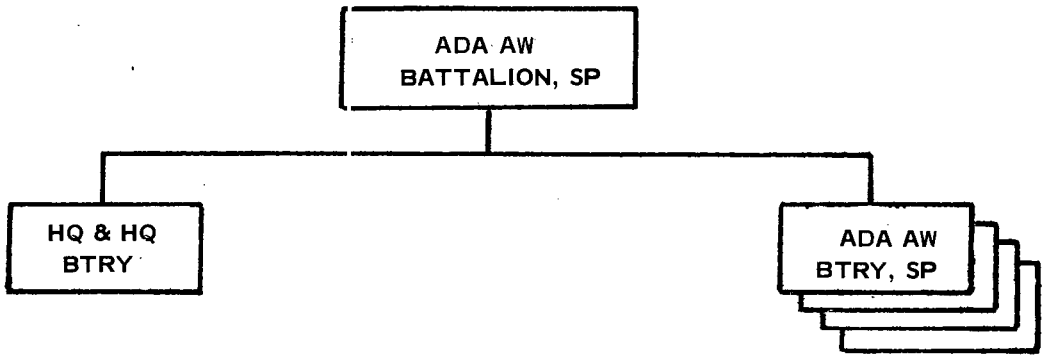

Figure 3. Air defense artillery automatic weapons battalion, SP.

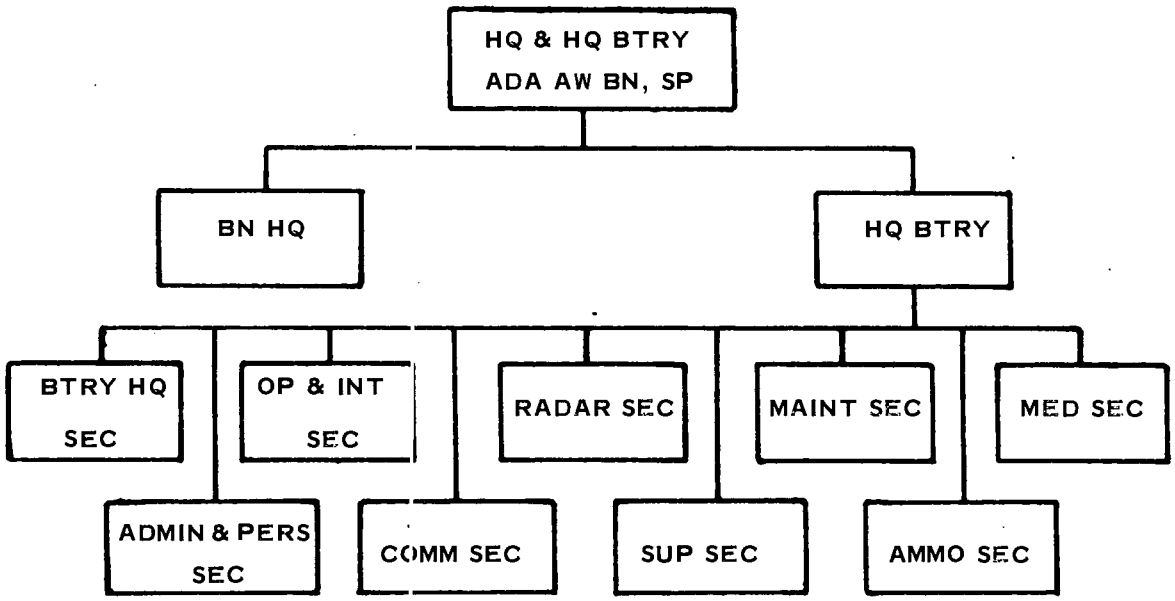

Figure 4. Headquarters and headquarters battery, ADA AW battalion, SP.

two platoons of eight M42 weapons. Each battalion establishes and maintains a battalion army air defense command post (AADCP) and an administrative command post. Normally, both of these are located within the battalion headquarters area.

a. Battalion AADCP. Tactical control of air defense operations of the battalion is exercised at the AADCP. At the AADCP, the battalion commander monitors the air battle situation and supervises the overall employment of his units. The battalion surveillance radar provides early warning information to the AADCP. This information is plotted, evaluated, and transmitted to firing elements of the battalion. An operations-intelligence section within the AADCP plans and coordinates future operations.

b. Battalion Administrative CP. Administrative and logistic functions of the battalion are performed at the battalion administrative command post. Staff officers operating from this facility may be required to provide assistance within the AADCP at various times.

7. Battalion Commander

The battalion commander is responsible for all battalion activities, including those affecting the employment and combat effectiveness of his

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unit. He is assisted and advised by his staff in the performance of his duties and exercises supervision of his units through the use of frequent personal visits, inspections, and reports. He is responsible for advising the force commander regarding the employment of his ADA AW units. In addition to his normal duties as battalion commander, he may be required to act as the staff air defense officer of the unit to which his battalion is attached or assigned. In this capacity, he coordinates air defense activities with other staff elements, prepares air defense plans and insures that air defense artillery units are employed to best support the mission of the force. The duties of command and of an air defense artillery staff officer are contained in FM 101–5.

8. Battalion Staff
(fig. 5)

a. Executive Officer. The executive officer is second in command of the battalion and acts as principal assistant and advisor to the commander. In general, his job is to relieve the battalion commander of detailed supervision of routine administration and operations, enabling the commander to devote himself to more demanding functions of command. The executive officer assumes command in the absence of the battalion commander. His duties correspond

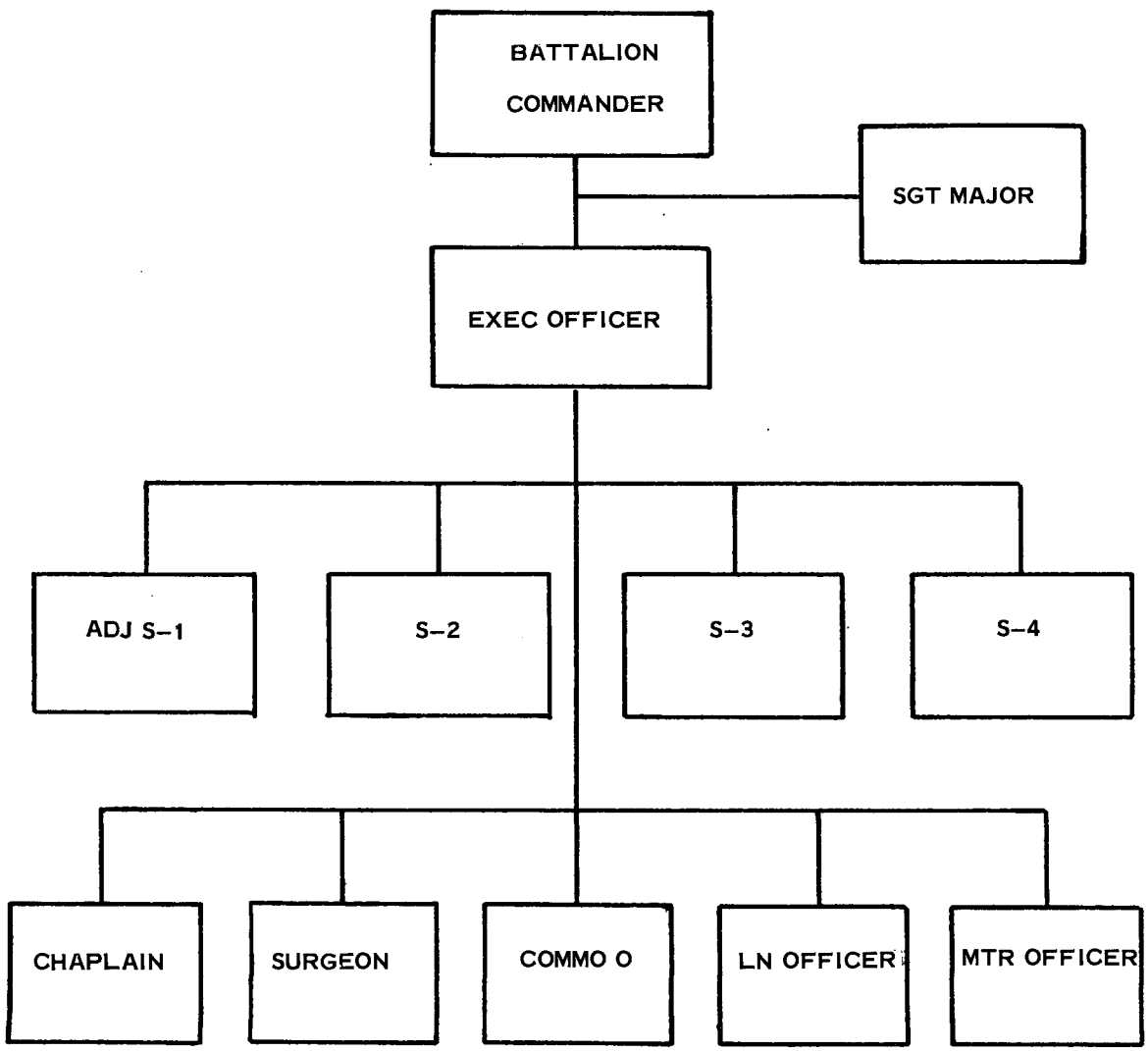

Figure 5. Battalion staff organization.

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to those of a chief of staff and/or deputy commander of higher echelon units as outlined in FM 101–5 and, in addition, are to—

(1) Coordinate and supervise displacement of the battalion.

(2) Insure the establishment and adequacy of local security and supplement any survivability measures.

(3) Coordinate the establishment and organization of the battalion headquarters area to include the Battalion AADCP.

(4) Exercise overall staff supervision of operations in the AADCP.

b. Adjutant. The adjutant, acting as the battalion S1, plans, coordinates, and supervises administrative and personnel functions of the battalion. His duties are similar to those listed in FM 101–5 for an ACofS, G1/AG. He is assisted in his duties by a unit personnel technician (WO).

c. S2. The S2 is the battalion intelligence officer with duties similar to those listed in FM 101–5 for ACofS, G2. He collects, evaluates, interprets, and disseminates all combat information and intelligence received at battalion headquarters. The S2 must work closely with the S3, providing him with current intelligence necessary in the planning of operations. In addition to duties as outlined in FM 101–5, his duties are to—

(1) Prepare the battalion security SOP and coordinate the local security plan of all elements of the battalion.

(2) Insure, in coordination with the S3, that procedures for recognition and identification of aircraft, as established by appropriate authorities, are understood and applied by all concerned.

(3) Insure proper emplacement and operation of the surveillance radar, and utilization of ground aircraft observer teams.

(4) Plan and supervise training in visual identification procedures.

d. S3. The S3 is the battalion operations and training officer, with duties similar to those listed in FM 101–5 for an ACofS, G3. He has one officer assistant. The principal duties of the S3, in addition to those listed in F M101–5, are to—

(1) Design and evaluate air defense for the battalion.

(2) Recommend allocation and mission assignment of battalion elements.

(3) Supervise operations in the Battalion AADCP. Although the executive officer exercises overall staff supervision, the S3 normally will be assigned responsibility to supervise normal day-to-day operations within the AADCP including training of AADCP personnel (plotters, tellers, etc.)

(4) Prepare and maintain a tactical SOP that includes—

(*a*) Measures for tactical control of the battalion.

(*b*) Procedures for AW squad engagement control and target selection.

(5) Supervise liaison activities.

e. S4. The S4 is the battalion logistics officer. He is assisted in his duties by the unit supply technician (WO), and may obtain information, estimates, recommendations and assistance from any special staff officer. He coordinates with the battalion surgeon on matters concerning medical evacuation. Principal duties of the S4 are similar to those outlined in FM 101–5 for an ACofS, G4.

f. Communication Officer. The battalion communications officer plans and supervises the installation and operation of the communication nets that are needed to meet the tactical and administrative requirements of the battalion. He provides advice and assistance on communications matters to all staff officers in their areas of responsibility. He supervises the battalion level maintenance of all communication equipment and assists the S1, S3, and headquarters battery commander in the reconnaissance, selection, and occupation of the head-

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quarters position area. Specific duties are as outlined in FM 101–5 for a signal officer.

g. Motor Officer. The motor officer advises the commander and staff on motor maintenance and transportation. He supervises the operation and maintenance of battalion wheel and track vehicles. His specific duties are similar to those outlined in FM 101–5 for a transportation officer.

h. Chaplain. The chaplain advises the commander and staff on moral and religious matters in the battalion. He coordinates his activities with the S1 and conducts religious services, advises personnel on spiritual and personal matters, ministers to sick and wounded, and corresponds with relatives of sick, wounded, and deceased personnel. He does not perform operational duties. See FM 101–5 for typical chaplain duties.

i. Liaison Officer. The liaison officer is the personal representative of the battalion commander, acting as a link between the battalion headquarters and the headquarters to which he reports. Functioning under the supervision of the S3, he makes sure that the tactics, techniques, and employment of his parent unit are understood by the commander of the organization to which he reports. He informs the battalion commander of changes in the tactical situation which influence battalion operations. The battalion may often have a requirement to establish liaison with adjacent SAM units, maneuver brigades and battalions, and/or to establish and operate an air defense element (ADE) in a division tactical operations center. Only one liaison officer is provided in the TOE, therefore, these requirements must be satisfied with battalion resources or augmentation provided by higher headquarters. See FM 101–5 for typical liaison officer duties.

j. Surgeon. The surgeon advises the commander on medical matters pertaining to battalion personnel. He normally functions in coordination with the S4 in matters of evacuation, and employment of medical personnel, equipment, and supplies. See FM 101–5 for typical surgeon duties.

k. Sergeant Major. The sergeant major is the senior NCO in the battalion and, as such, is the commander's advisor and representative in matters concerning noncommissioned officers in the battalion. He performs certain administrative functions and works closely with the S1.

9. Headquarters Battery

Headquarters battery furnishes the necessary enlisted personnel and equipment to assist the battalion commander in functions of command, reconnaissance, communication, intelligence, logistics, and administration. See TOE 44–86 for details of organization.

10. Headquarters Battery Commander

The headquarters battery commander commands headquarters battery and acts as headquarters commandant. As headquarters commandant he is responsible for—

a. Coordinating staff requirements with battery resources.

b. Organization of the battalion headquarters area.

c. Local security of the headquarters area.

d. Organizing the movement of battalion headquarters.

e. Supervision of mess and transportation facilities for battalion headquarters.

Section II. AUTOMATIC WEAPON BATTERIES

11. Battery Organizations

a. ADA Automatic Weapons Battery, SP (M42). This battery consists of a battery headquarters section, a communications section, and two platoons of eight automatic weapons squads each. Each platoon has four sections, each consisting of two squads. A weapon squad consists of one M42 weapon and its crew of five men.

b. ADA Machinegun Battery, Cal. .50. The machinegun battery, cal. .50, consists of a battery headquarters section and six sections with

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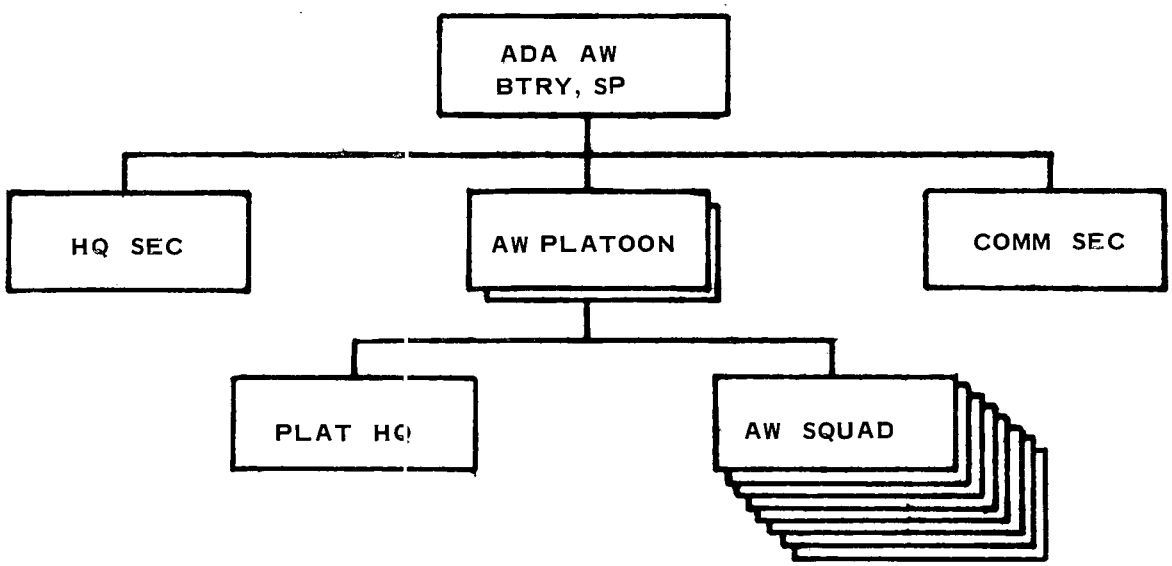

Figure 6. ADA automatic weapons battery, SP.

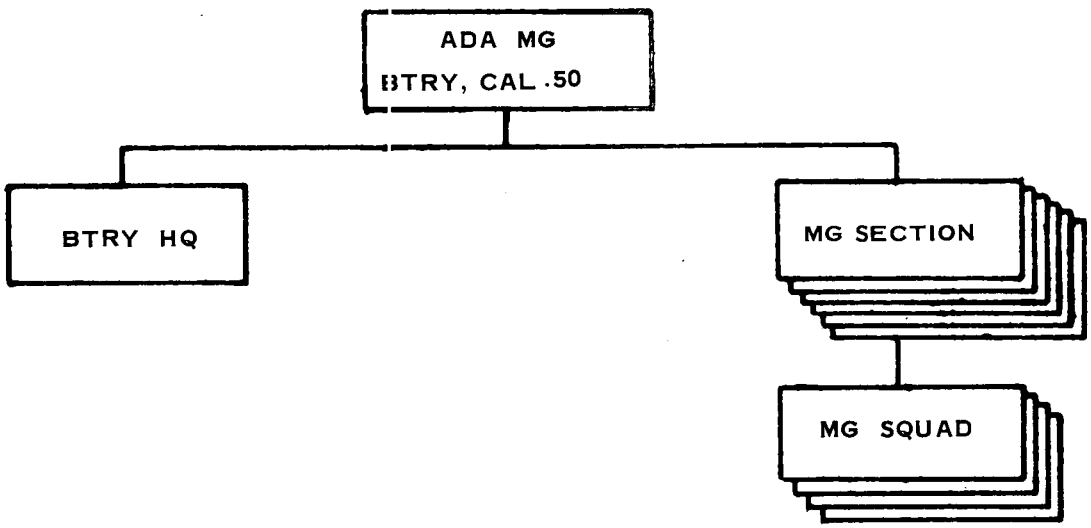

Figure 7. ADA machinegun battery, cal. .50.

four machinegun squads each. A machinegun squad consists of one M55 quadruple caliber .50 machinegun, a 2½-ton prime mover, and crew of 4 men.

12. Battery Commander

The ADA AW battery commander is responsible for all activities of the battery, including administration, training, maintenance and tactical employment.

13. Battery Executive Officer

The battery executive officer assists and advises the battery commander and insures that his policies are carried out. He is second in command of the battery and may act as battery liaison officer with supported units. He is normally designated battery security officer. As such, he has direct responsibility for establishing and maintaining local security of the battery; integrating local security plans with those

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of the unit to which attached; and coordinating local security plans with defended units.

14. Platoon Leaders and Section Leaders

Platoon leaders (M42) and section leaders (M55) are responsible to the battery commander for supervising the readiness and effectiveness to include training, tactical employment, maintenance and administration of their platoon (section).

15. Squad Leader

The squad leader has direct responsibility for the combat effectiveness of his squad. He supervises target selection and identification, and exercises engagement control of his fire unit. His responsibilities and functions are to—

a. Train his crew in service of the piece.

b. Train his crew in the SOP of engagement control and target selection and identification.

c. Insure the application of such basic tactical principles as—

(1) The use of primary and secondary sectors of fire.
(2) All around, mutually supported sectors of fire.
(3) Early warning.
(4) Advantageous use of terrain.
(5) Engaging targets at maximum effective range and continuing the engagement until the aircraft is destroyed or out of range.
(6) Smooth and rapid target transfer during a multiple target raid.
(7) Training of personnel in identification criteria and communications procedures.
(8) Use of measures to enhance survivability.
(9) Capabilities and limitations of his weapon and crew in both the air defense and ground roles.

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CHAPTER 3

COMMAND AND CONTROL

Section I. COMMAND RESPONSIBILITIES

16. General

FM 44–1 presents the principles of command and control of theater air defense operations, and a detailed listing of Army air defense officer functions at all levels.

17. Theater Commander

Air defense resources are allocated to a theater by the Joint Chiefs of Staff, based on the theater commander's recommendations. The theater commander exercises operational command of all theater air defense forces through the component commanders (para 18) or an area air defense commander (para 19). Air defense functions of the theater commander include—

a. Establishing the theater priorities for air defense.

b. Approving the allocations of air defense resources for defense of the theater priorities.

c. Designating a single commander for theater air defense. This commander is the area air defense commander with the total theater area usually being subdivided into air defense regions.

18. Army Component Commander

a. The Army component commander assigns, organizes, and employs Army air defense resources made available in accordance with the theater commanders operational priorities and plans.

b. ADA AW battalions and batteries required for defense of field army forces and installations normally are assigned to the field armies for further attachment within the field armies. ADA AW elements are commanded by the unit to which assigned or attached, except that certain air defense control functions normally are retained by the area and appropriate regional air defense commanders (para 19).

c. ADA battalions and batteries required for defense of theater-designated target areas other than the field army area, normally are placed under the operational command of regional air defense commanders (para 19). The Army component commander can exercise command, less operational command, of these units through the creation of a theater army air defense command (TAADC) if warranted by the size of the air defense forces and the nature of the tasks involved; or, he may exercise his command functions directly through his air defense staff or indirectly through the senior nonfield Army ADA headquarters.

19. Area and Regional Air Defense Commanders

a. The area air defense commander (para 17*c*) is responsible for coordination and integration of the entire theater air defense effort. Subject to the authority of the theater commander, he will promulgate the broad policies and procedures for the employment and coordination of the theater air defense means.

b. The area air defense commander, in the exercise of his responsibility for coordination and integration of the entire theater air defense effort, establishes air defense regions. The regional AD commanders are fully responsible for

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and will have full authority in the air defense of their regions. They will, however, normally delegate authority to the field army commander (para 20) for "control and operational employment" [1] of ADA resources assigned to the field armies. The precise meaning of the foregoing term "control and operational employment" depends upon the air defense control functions retained by the regional air defense commander, but may be stated as "command, less specified functions." The specific functions *retained* by each regional air defense commander in this delegation of authority are specified in detail in each situation and will be influenced by the state of hostilities and the air situation. Wartime functions retained which influence ADA AW operations may include prescription of the states of AD alert, AD rules for engagement, and ADA weapon control. These control items are discussed further in paragraph 27.

c. The regional air defense commander normally retains operational command of ADA AW battalions and batteries deployed in defense of nonfield army targets; e.g., a critical tactical air force airbase or other vital COMMZ target.

20. Field Army and Corps Commanders

a. ADA AW battalions and batteries required for defense of designated vital areas in the army service area are retained at field army level under the command of the field army air defense organization (normally an ADA brigade). ADA AW units are also attached to the corps, for attachment to the corps air defense organization (normally an ADA group). The corps may further attach ADA AW units to the divisions as required.

b. ADA AW units are responsive to the air defense needs of the command to which assigned or attached, subject to any functions retained by the regional AD commanders. Typical functions retained by regional AD commanders include authority for establishment and changes of standing rules pertaining to control of AW fires (para 27).

[1] Term quoted from JCS Pub 8.

21. Division Commanders

a. Division organization for combat is the prerogative of the division commander. The ADA AW unit (normally a battalion-size unit) normally is retained under division control.

b. The normal ADA AW unit organization for combat for air defense of the division priority installations and units places all units in a battalion-size ADA organization directly responsive through the ADA commander to the division commander. This does not preclude *attachments for rations,* or other similar *limited attachments,* of the forward ADA elements to other divisional elements when appropriate. ADA AW units assigned an air defense mission are attached to subordinate divisional elements only to the extent required for the successful accomplishment of their mission.

c. Detailed attachment of AW elements is normal for units assigned a ground mission (further discussed in para 25).

d. An ADA AW unit assignment or attachment order must be explicit in terms of functions to be performed by the gaining commander, and functions to be retained in ADA organization channels. A typical breakout of functions is as follows:

(1) Gaining commander—operational command.

(2) ADA parent organization.
- (*a*) Control *air defense* fires (para 27), in response to the requirements of the theater air defense system.
- (*b*) Furnish agreed portions of the organization's administrative/logistic capability to units which are to be further attached.
- (*c*) Provide advice regarding allocations, capabilities, administrative, and logistics.
- (*d*) Manage personnel transfers and promotions.

22. ADA AW Unit Commanders

a. When an ADA AW unit is assigned or attached to another unit for defense of that unit, the senior ADA AW commander is a subordi-

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nate commander to the gaining unit commander. An exception, which does not affect command responsibilities and prerogatives, is that ADA AW commanders receive orders regarding control of air defense fires (para 21*d* (2) and para 27) via *air defense* channels. These orders may be received directly from the parent ADA organization, or indirectly through the unit to which attached. The former method is preferred when assigned an air defense mission to take advantage of the established quick reacting air defense nets.

b. An ADA AW commander's responsibilities to those unit firing elements which have been further assigned or attached to other units are as outlined in paragraph 21*d*(2). An ADA AW commander who has all firing elements further attached will position his command post to best advise and assist the headquarters to which his headquarters is assigned or attached, will maintain any radar surveillance capability, and will plan for changes in mission and command arrangements.

Section II. CONTROL MEASURES

23. General

Key control elements include control of unit allocations, mission assignment, control of maneuver, and control of fires. Control is exercised through dissemination of detailed unit SOP based on theater air defense policies and procedures, and by provision of liaison and communications as discussed in paragraph 28.

24. Control of Allocations

Allocations of ADA AW units are made in accordance with established priority lists for air defense as discussed in paragraphs 17 through 21. A commander receiving an allocation of these units may suballocate them as necessary to accomplish his mission. Any limitations placed on the receiving commander must be defined in the terms of attachment or assignment.

25. Mission Assignment

a. An ADA AW unit assignment attachment carries with it a mission to provide air defense of or for the force, unless specified otherwise. A force receiving an ADA AW unit allocation further assigns missions of defense of specified vital areas or force elements, subject only to limitations which may be included in the assignment or attachment order. Because the air defense means made available are generally limited, the force commander should prescribe priorities for air defense of his force units or installations. Assignment of ground support missions normally will be advisable only in a low air threat environment, except that a commander's right of self defense with all available weapons is never denied.

b. An ADA AW squad is assigned either an air defense or a ground support mission; never both simultaneously. Distinct mission assignment is necessary due to the differing deployment, and control concepts for accomplishment of the air defense and ground support mission. This does not preclude all feasible integration of the ADA AW capability into the local ground security plan of the unit to which attached, under either mission. Nor does it preclude self defense against either ground or air attack.

26. Control of Maneuver

The ADA AW commander maneuvers his units as necessary to defend or support the forces to which assigned or attached. Coordination requirements often will be imposed by higher echelons, especially in nonfield army ADA AW organizations.

27. Control of ADA AW Fires

a. Concepts.

(1) The right of self defense against air and ground attack is never denied.

(2) ADA AW squads during wartime normally make *air defense* engagement decisions based on the SOP that aircraft *positively* identified as hostile

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will be engaged. This rule may be changed infrequently by higher echelons to allow relatively unrestricted engagement or to impose increased fire restrictions. This concept for control of fires is dependent upon provision of a clear and detailed air defense SOP covering the items discussed in *b* through *h* below, and communications to allow higher echelons to modify the air defense SOP if the situation demands.

(3) ADA AW units assigned a ground support mission deliver surface-to-surface fires in accord with the force commander's decisions.

b. Theater Alert System. The theater commander insures an orderly transition from peace to war through use of an alert system. The state of alert serves as a basis for the establishment of air defense rules for engagement.

c. Rules for Engagement.

(1) Rules for engagement are promulgated by the area air defense commander in order to define, as a minimum, the responsibilities, procedures, and criteria for aircraft identification and engagement in consonance with the theater alert system.

(2) Following are rules for engagement considered typical for ADA AW operations:

(*a*) *States of alert short of war.* Engagements are conducted only in self defense or as ordered by designated AD commanders.

(*b*) *Wartime state of alert.* Engagements are conducted in accord with the prevailing weapon control status (*d* below) and the hostile criteria (*e* below).

(3) Implementation of the rules by ADA AW squads requires that visual determination be made of the friendly or hostile character of each aircraft; therefore, the rules are based on use of detailed visual identification criteria. Visual identification is discussed further in *i* below.

d. ADA Weapon Control. Each ADA weapon control status indicates the degree of air defense fire restriction imposed upon the ADA AW squad. A "normal" wartime status for ADA AW should be specified in the rules for engagement. Authority to change ADA weapon control status, if any, should also be specified. The ADA weapon control status terms defined and discussed below may be combined to give, for example, more freedom to fire at fixed wing aircraft and less freedom to fire at helicopters.

(1) *Weapon free.* Fire at any aircraft not identified as friendly. Under this status, "unknowns" may be engaged.

(2) *Weapon tight. Fire only at aircraft positively identified as hostile. This should be the normal ADA weapon control status for ADA AW squads in wartime.* Theater rules for engagement will specify exact criteria for declaring an aircraft hostile when operating under this status. Examples of hostile criteria are presented in *e* below.

(3) *Hold fire.* Do not fire, cease fire. This term, as defined in Army regulations, should not impose a blanket restriction on an entire area and all flights therein but only on certain indicated flights. Due to the difficulty of transmitting accurate flight information to ADA AW squads, it may be necessary to have this ADA weapon control status apply to ADA AW squads within a designated area in terms of time, and basic aircraft type (for example: hold fire 1400–1430 hours, rotary wing; or, hold fire 1400–1430 hours, F–105 strike). This status should only be invoked if safeguards over and above those inherent in the "normal" weapon tight status are required.

e. Hostile Criteria. (Example). The theater rules for engagement will define criteria by which an aircraft may be designated hostile.

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For example, SOP may classify as hostile, aircraft which are—

(1) Attacking friendly elements.

(2) Spraying or smoking friendly elements without prior coordination.

(3) Dropping flares at night over friendly territory without prior coordination.

(4) Discharging parachutists or unloading troops in numbers in excess of the normal aircraft crew without prior coordination.

(5) Engaging in mine-laying operations without prior coordination.

(6) Improper or unauthorized entry into an area designated as restricted.

(7) Dropping ECM devices, e.g., chaff and reflectors, over friendly territory without prior coordination.

(8) Bearing the military insignia or having the configuration of an aircraft employed by a known enemy nation.

f. Control Mode.

(1) *General.* The rules for engagement may specify or imply the required ADA AW control mode.

(2) *Centralized.* Under this control mode an air defense commander may require that engagements be conducted only after receipt of permission from a designated higher air defense echelon. The higher echelon may also designate tentative targets, by voice command, when operating in this mode. The right of unit self defense is not denied. This mode is not appropriate for ADA AW squads during wartime.

(3) *Decentralized.* Under this control mode, engagement decisions are made at the ADA AW squad level, based on the rules for engagement and subject to any temporary engagement restrictions imposed by higher echelons. This is the normal wartime control mode for ADA AW squads conducting air defense missions.

g. Fire Distribution. Fire distribution in an ADA AW defense is achieved through proper defense design and is further insured by an SOP which requires the ADA AW defense commander to assign each ADA AW squad a primary sector of fire. Targets appearing in the primary sector receive priority over those in secondary sectors of fire. As a general rule, the target in the primary sector that is most threatening, i.e., the one that will apparently arrive first, will be engaged first. As many automatic weapons as possible should be brought to bear on every target unless ammunition is very limited.

h. Firing Doctrine.

(1) ADA AW squad normally should engage aerial target with continuous fire until the target is destroyed or out of range. When tracer density in a multiple ADA AW defense precludes tracer sensing, fire should be placed well in front of the aircraft so that the aircraft is forced to fly into or through an air defense barrage.

(2) ADA AW squad normally engage surface targets with continuous fire or short bursts, as appropriate.

i. Visual Identification. ADA AW operations under the recommended control concept involve *visual* aircraft recognition by the ADA AW gunner and/or squad leader. It is essential that all ADA AW unit weapon crew personnel be well trained in visual aircraft recognition. Use of flights by friendly aircraft common to the theater in which the ADA AW units are employed should be an integral part of field recognition training.

28. Coordination of Operations

a. General. ADA AW operations must be coordinated with the defended or supported unit force and the area air defense system. Coordination is accomplished through use of liaison personnel and communications. Coordination is enhanced through collocation of command posts whenever feasible.

b. Liaison. Liaison requirements vary with force organization. As a general rule, ADA AW

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battalions, batteries, and platoons should establish personnel liaison with the force to which assigned or attached whenever the force and ADA command posts are not collocated. ADA AW liaison personnel usually operate in the force operations center and are responsible that the force commander and staff understand ADA AW tactics, techniques, and employment and that the ADA AW commander represented is kept abreast of changes in air defense requirements and the ground tactical situation.

c. Communications. Communications are also required for rapid receipt of changes to the air defense SOP for control of fires (para 27). These latter communications follow the ADA operational chain of command, and eventually terminate in a designated area air defense operations center. Lower echelon ADA AW elements, when assigned or attached to other units, may find it necessary to establish a portion of the required control of air defense fires link through the communications network of the unit to which assigned or attached. However, communications for coordination or control of fires through ADA channels are preferred.

Section III. TYPE COMMAND ARRANGEMENTS

29. General

ADA AW command arrangements are tailored to each force organization and situation. Figures 8 through 10 depict several "type" structures, which are discussed in the following paragraphs. These figures represent only three of the many possible solutions to the problems of command and air defense control.

30. ADA AW Assigned to the Field Army

a. Figure 8 depicts a type allocation and command arrangement for ADA AW units assigned to a field army for conduct of air defense missions. Note that "specified functions," usually pertaining to control of AW fires (para 27) are retained in air defense channels. Command, less specified functions, is exercised by the force to which assigned or attached.

b. The type ADA AW unit allocation depicted provides nine M42 battalions and six M55 batteries to the type field army. Although some of this capability could be retained under the field army air defense brigade for purposes of complementing Nike Hercules and Hawk defenses of field army vital areas in the army service area, figure 8 shows all the ADA AW units further attached.

c. The M42 battalions are shown further attached to the divisions. M55 batteries may also be attached to the divisions, but in figure 8 these are retained at corps level for use as required; e.g., for close-in defense of surface-to-air missile sites.

d. Although the M42 battalion normally accomplishes the divisional air defense mission without further attaching M42 batteries and platoons to divisional elements, figure 8 shows one M42 battery further attached to each brigade for brigade air defense during an assumed maneuver. One M42 battery is retained under direct M42 battalion control for air defense of other division priority targets; e.g., the nuclear delivery means.

e. An ADA AW battalion assigned a ground support mission will organize for combat to best accomplish this mission. This may be by attaching individual firing elements to designated divisional elements or by supporting the division as a whole as a battalion. The former method is normal.

31. ADA AW in COMMZ Defenses

Figure 9 depicts a type weapon allocation and command arrangement for ADA AW units retained under the operational command of the regional air defense commander for defense of critical theater installations. Depending on the defense requirements of the various vital area, "defense commanders" could be interposed at any point in figure 9. These commanders would be directly responsive to the regional air de-

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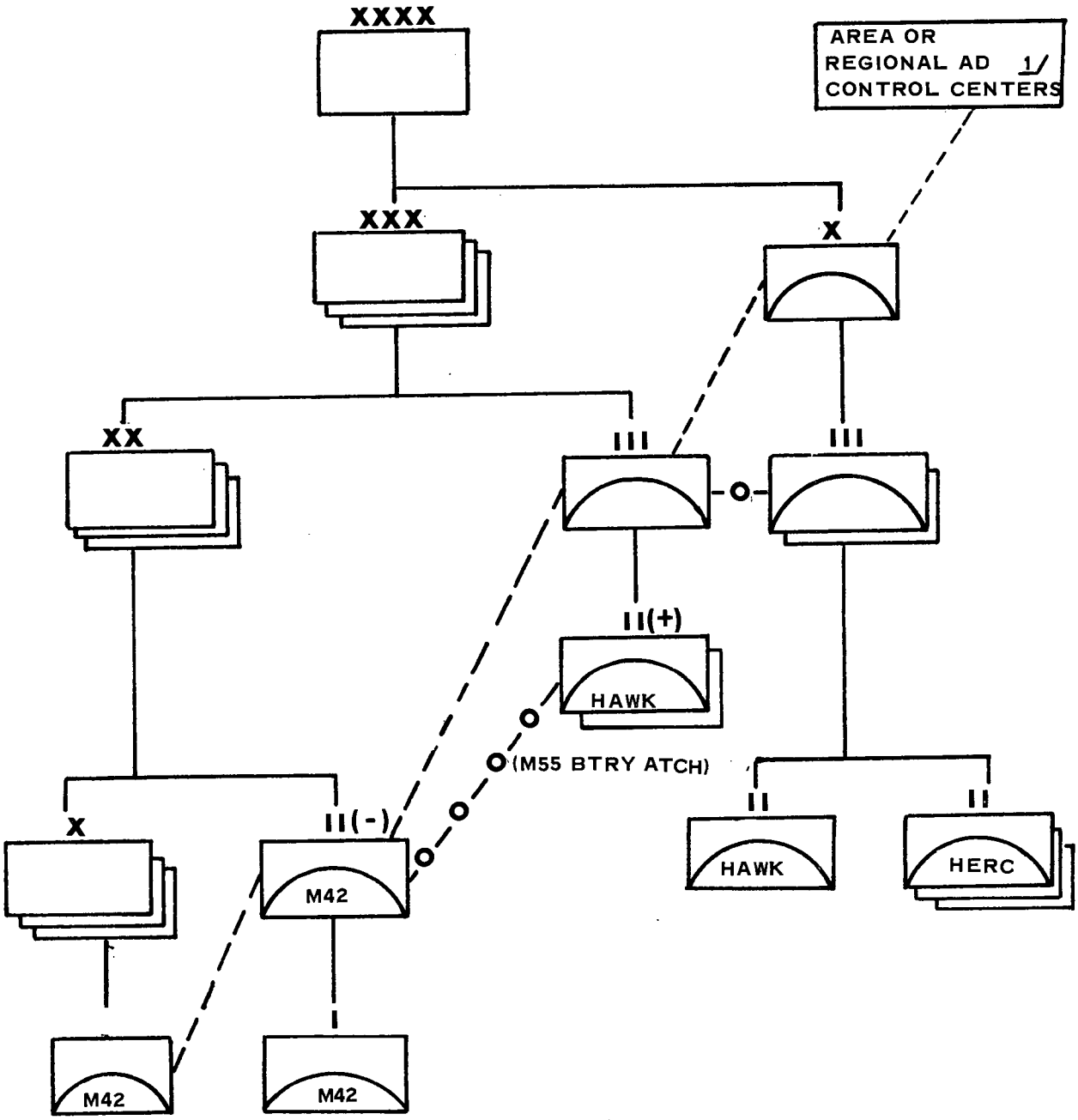

Figure 8. ADA AW units in a field army.

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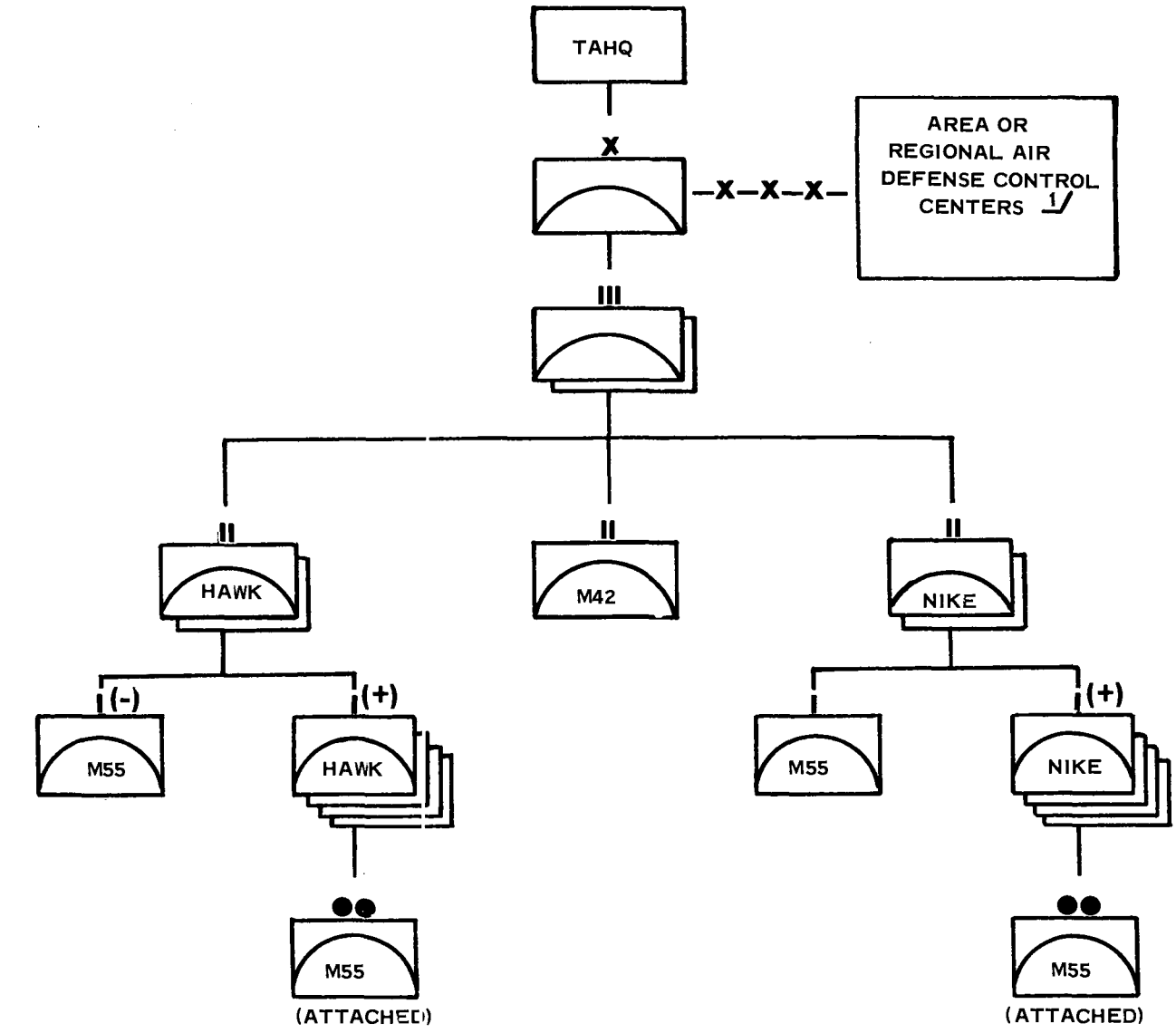

Figure 9. ADA AW units in COMMZ defense.

fense commander and would exercise operational command over all air defense artillery units assigned to the vital area defense.

32. ADA AW in Airbase Defenses

In the tailored airbase defense depicted in figure 10 the Hawk battalion commander is the vital area defense commander. In general, Army air defense units conducting the defense of an airbase remain under Army command subject to specified functions delegated to, or retained by, the other commanders concerned. Factors influencing the relation of the vital area defense commander to the other commanders

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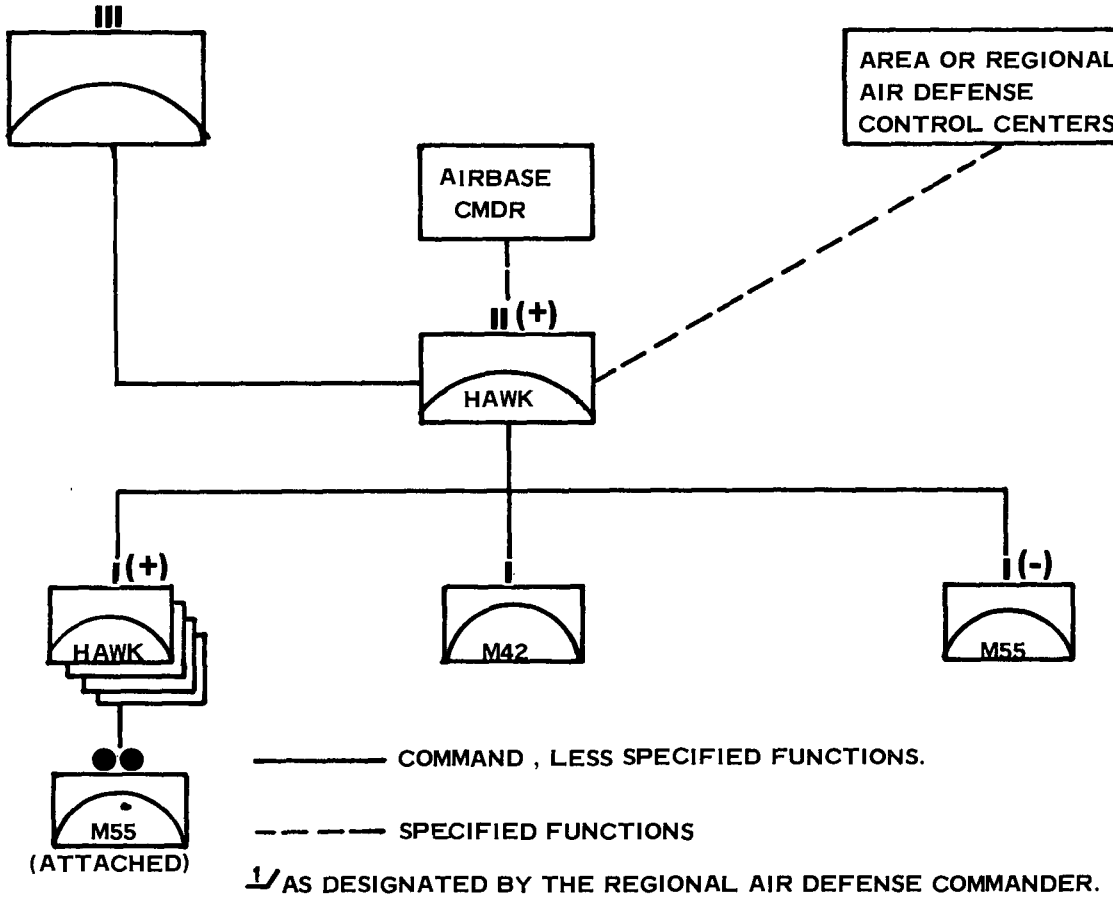

Figure 10. ADA AW units in theater airbase defense.

include the provisions of local agreements for administrative and logistic support, whether the airbase commander is responsible for his own defense or is simply receiving defense from the regional air defense system, and specific operational command functions retained by the regional air defense commander.

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CHAPTER 4

FUNDAMENTALS OF ADA AW EMPLOYMENT

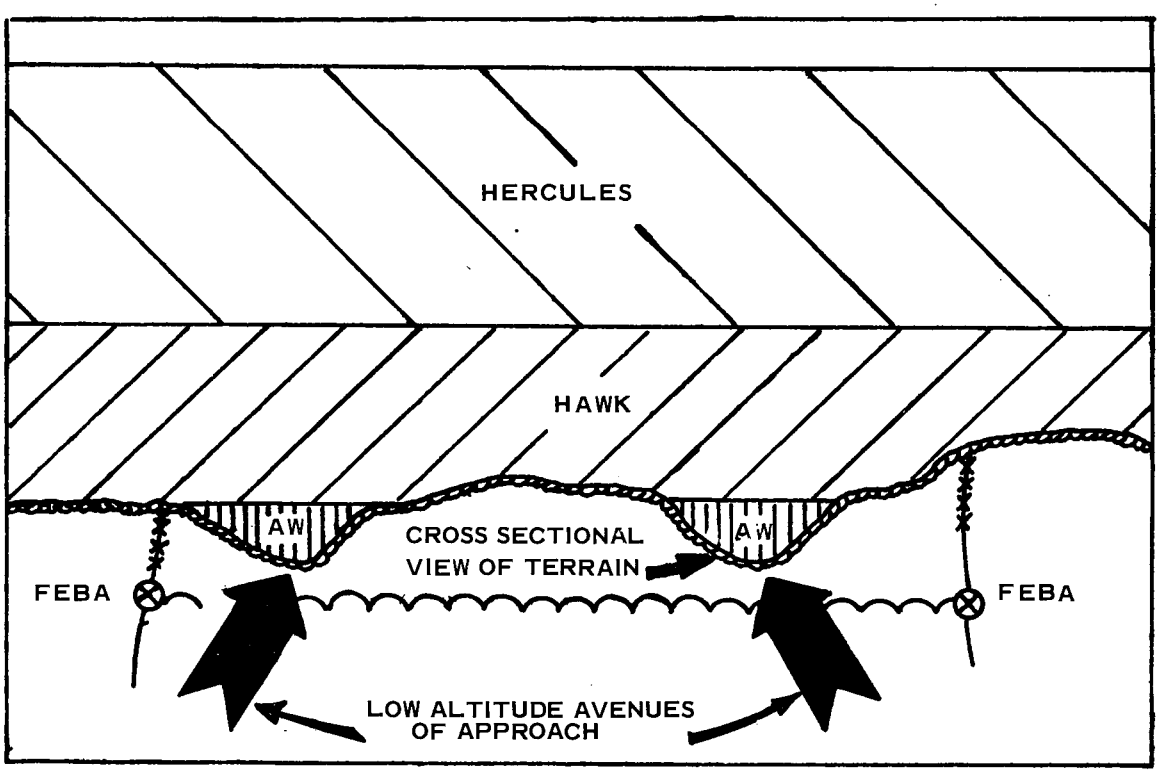
Section I. GENERAL

33. Introduction

ADA AW units are part of a family of ADA weapons. This family of weapons provides air defense capable of countering the full spectrum of the enemy air threat. The important place occupied by ADA AW in the family of ADA weapons is illustrated in figure 11. As a member of the ADA family, ADA AW should be employed to provide low altitude air defense for priority units or installations. First consideration should be given to those units or installations located in the folds of the earth where radar directed SAM systems are ineffective or absent.

34. Mission Considerations

a. General. The role, air defense or ground support, in which ADA AW elements are employed is determined by the force commander to which they are assigned or attached. This



NOTE:
1. ADJACENT COVERAGES OVERLAP.
2. EMPLOYMENT OF ADA AW IS NOT LIMITED TO LOW ALTITUDE APPROACHES.

Figure 11. Family of weapons coverage.

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determination is based upon the force commander's assessment of the greatest threat to the success of his overall mission. Employment of ADA AW elements in a ground support role in the face of an air threat degrades the air defense of priority units and installations in direct proportion to the number of weapons withdrawn for ground support. In such a case, the force commander risks the loss of these undefended assets to air attack. The process of balancing threat, mission and priorities with AD resources is continuous. The force commander is advised and assisted in this process by the senior air defense artillery commander.

b. ADA AW units can provide two basic types of low altitude air defense—defense of mobile units, and defense of fixed or semifixed vital areas.

(1) *Defense of mobile units.* ADA AW can provide air defense for combat and combat support units deployed or moving within the forward area. In this type of defense, detailed planning, preparation, and improvement of positions may not be possible, and the problems of combat service support and communications are increased.

(2) *Defense of fixed or semifixed vital areas.* This type of defense includes (but is not limited to) airfields, bridges, logistic installations, and large command posts. Usually, detailed planning, deliberate reconnaissance, selection, and occupation of position, and optimum siting of weapons are possible.

35. Employment Considerations

Certain basic steps should be followed when establishing defenses. Although the tactical situation may prevent all steps from being taken, each should be followed whenever possible. These steps are—

a. Determination of Priorities. Since allocations of ADA AW units are normally limited, the force commander must establish an order of priority for air defense of his assets against low altitude attack. In establishing such priorities, consideration should be given to any SAM system coverage and to the effectiveness of passive air defense measures. The ADA AW unit commander obtains the priorities for defense from the force commander, and plans the employment of his resources on the basis of these priorities.

b. Employment of Means. The ADA AW commander will employ his resources in the manner which best meets the force commander's requirements. Critical considerations are the established priorities for defense, the number of weapons required, and the number of weapons available. If the number of weapons available does not permit all priority requirements to be satisfied, the air defense commander must recommend the best utilization of his resources.

c. Defense Design. In order to make the best use of available weapons, the S3 or other individual designing the defense should begin by using design templates and maps to determine tentative positions for weapons. In designing the defense, the following should be sought: balance, mutual support, early engagement, and weighting along likely low altitude avenues of approach.

d. Reconnaissance, Selection, and Occupation of Position. Whenever possible, a ground reconnaissance should be conducted to select individual weapon positions, using the tentative defense design as a guide. Terrain and vegetation conditions, presence of other units, and other factors which cannot be determined from a map and which influence the defense design should be reported, and necessary adjustments made to the defense design.

e. Readjustment of Positions. After initial deployment of weapons, minor readjustment of positions may be required to improve fields of fire mutual support, communications, and security.

f. Improvement of Positions. After a position has been occupied and the weapon emplaced, improvement of the position should begin immediately. Improvement is a contin-

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uous process throughout the period of occupation. Cover and concealment should be provided, wire communications installed, and measures taken to improve survivability. Alternate positions also should be selected and continuously improved.

Section II. PRINCIPLES AND FACTORS INFLUENCING AIR DEFENSE DESIGN

36. Principles Influencing Air Defense Design

a. General. Once air defense priorities are established by the force commander, the ADA commander must determine how best to use his resources. ADA AW squads must be deployed to provide effective air defenses for as many of the force commander's assets as possible and in descending order of priority. To achieve maximum effectiveness, the AD commander considers and strives to apply certain basic principles for each defended unit or installation. While factors such as the expected threat, terrain, number of available weapons, and the size, shape, and proximity of other defended installations may tend to arrange these principles in some order of relative importance, it is desirable that each be applied to the maximum extent possible.

b. Balanced Defense. In general, enemy aircraft are capable of attacking from any direction and will seek the most favorable direction of attack. The enemy will attempt to exploit any weakness in the defense. Therefore, the defense should be balanced to cope with attacks from any direction with about the same volume of fire. An exception to the foregoing arises in the case where attack along certain avenue(s) is forced or probable (see *e* below).

c. Mutual Support. This principle is applied by positioning each ADA AW squad so that its dead zone is within the engagement capability of at least one adjacent squad. This increases the volume of fire possible in the space mutually covered. To remain mutual supporting, M42 squads should not be separated by more than 1,100 meters, and the distance between M55 squads should not exceed 500 meters. Weapon crews must be capable of detecting targets at maximum distances in order to provide mutual support. Space that is masked to one weapon should be covered by another.

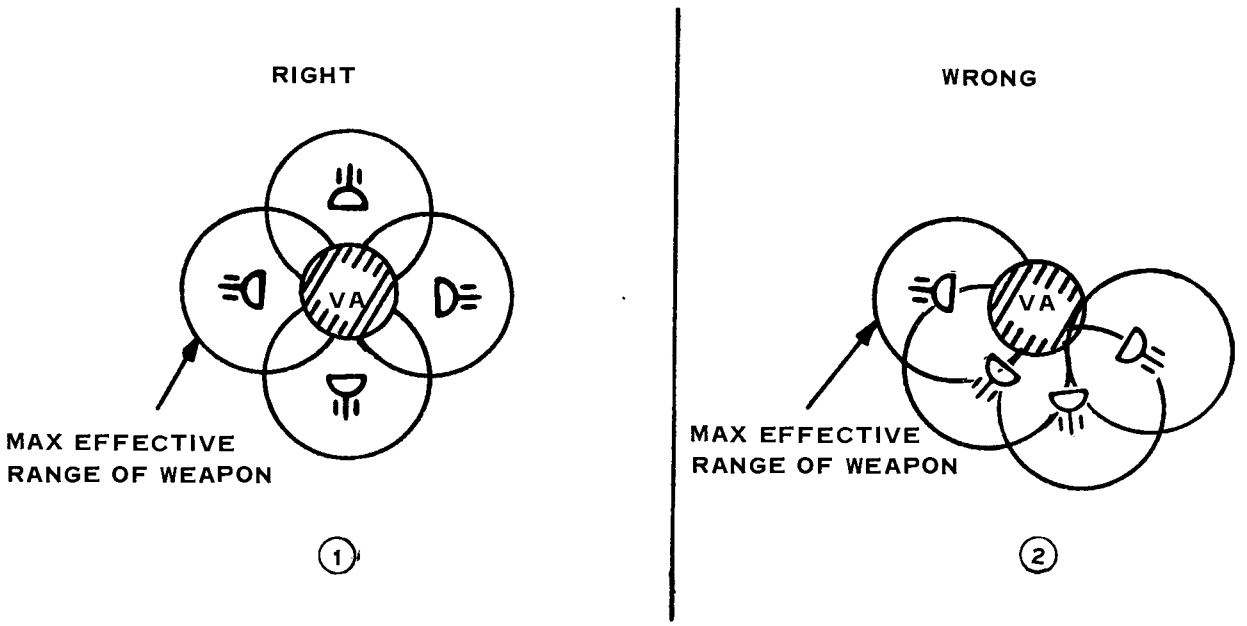

Figure 12. Balanced defense.

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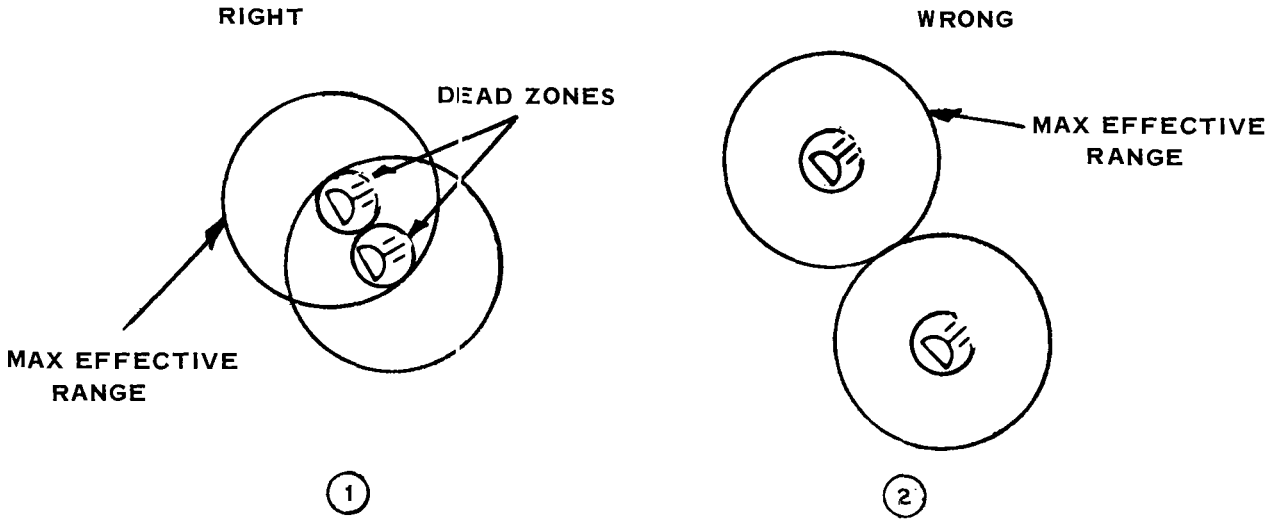

Figure 13. Mutual support.

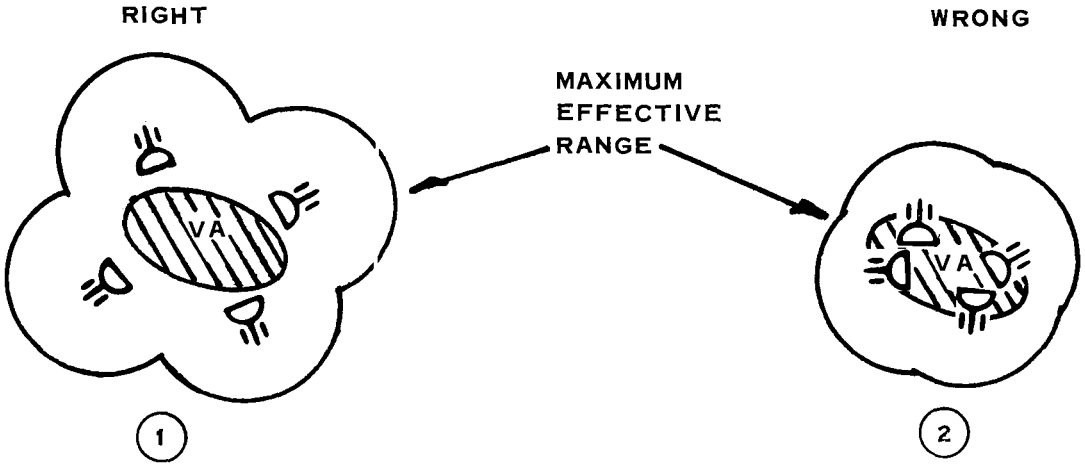

Figure 14. Early engagement.

d. Early Engagement. The object of early engagement is to engage and destroy hostile aircraft prior to the aircraft releasing its ordnance. Since the enemy has such a wide choice of aircraft, ordnance, and attack variations, specific rules for the emplacement of weapons to maximize the principle of early engagement cannot be formulated. The degree of early engagement must therefore be determined by the size of vital area (VA), the number of weapons available, and the need for balance, mutual support, and the other principles discussed herein. Ground aircraft observers and the battalion radar facilitate early engagement by providing early warning to the ADA AW squads.

e. Weighting the Defense. ADA AW squad deployments should be weighted toward low altitude avenues of approach since these avenues usually offer the enemy a higher probability of executing a successful attack. The decision to weight the defense must be carefully considered since weighting unavoidably results in some degradation in defense balance. Proper weighting usually will require more fire units to be deployed, since all-round defense normally should be provided. In some cases,

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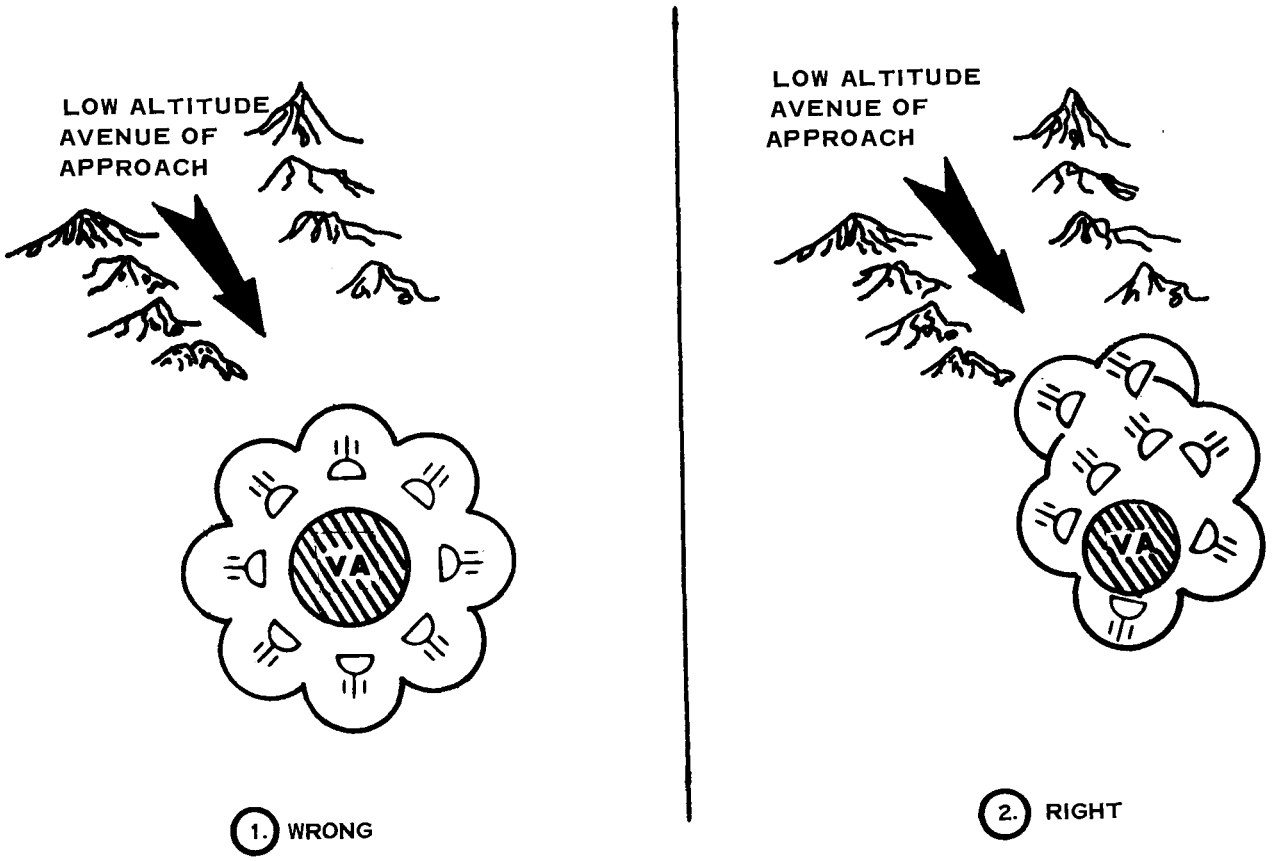

Figure 15. Weighted defense.

however, weighting may be more desirable than balance (e.g., where a vital installation is located in a deep valley which reduces the probability of attack from some directions).

f. Defense in Depth. Once engaged, the enemy should be given no relief. The aircraft should be engaged from the moment it comes within weapon range. The volume of fire to which an aircraft is exposed should steadily increase as it closes with the target. Proper application of the principles described herein will result in achieving defense in depth.

37. Factors Influencing Air Defense Design

The ADA commander must consider a number of factors that influence the application of the principles discussed above.

a. Threat. The threat factor influences all aspects of air defense planning. The defense must be able to cope with a combination of weapons and techniques that is likely to be employed by the enemy. Enemy capabilities may range from rotary wing to high performance aircraft, from conventional to nuclear munitions, and from dive bombing to LABS tactics. ADA AW squad positions are adjusted to match weapon capabilities as much as possible with enemy tactics and ordnance.

b. Terrain. Terrain will influence both the type and direction of attack by the enemy, and the location of ADA AW squad positions. Terrain may limit the number of suitable AW positions available without adversely affecting the enemy, or it may compel the enemy to approach his target from certain directions. It may complicate detection of enemy aircraft by radar, ground aircraft observers, and weapons crews. Generally, a larger number of weapons is required where terrain precludes optimum siting. When the enemy is obviously canalized, ADA AW deployments can be

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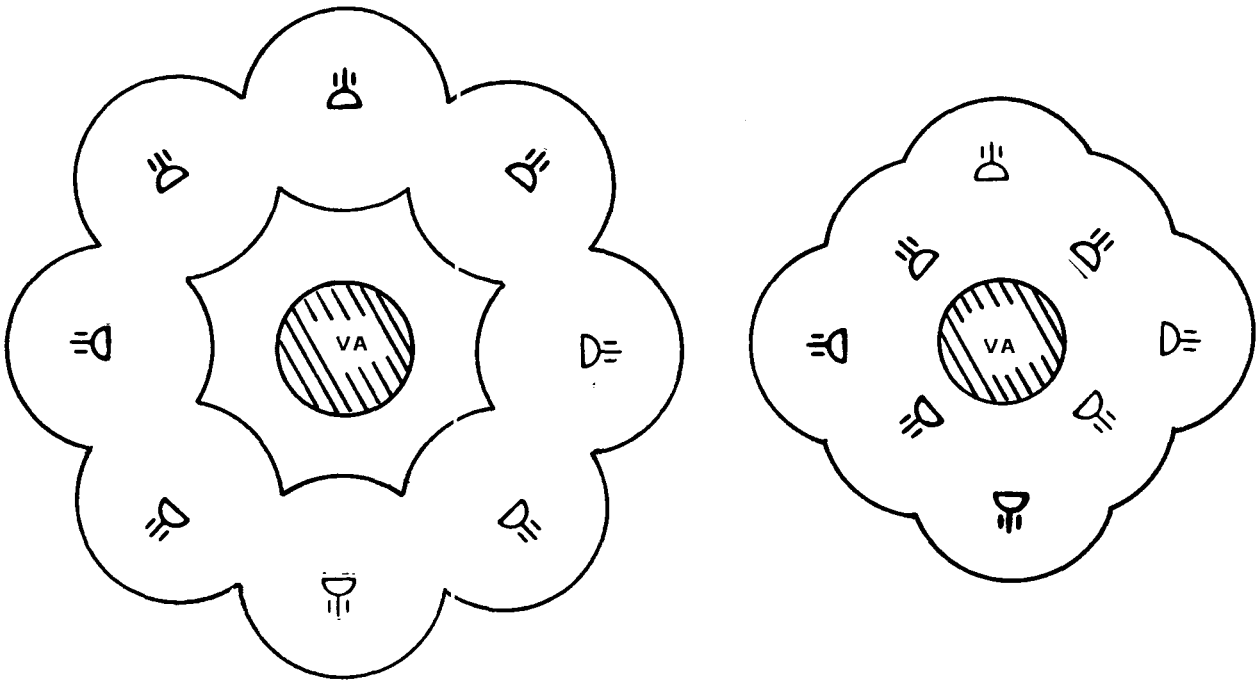

(1) DEFENSE WITHOUT DEPTH.

(2) DEFENSE WITH DEPTH.

Figure 16. Defense in depth.

weighted along the expected avenue of approach as a tradeoff with the principle of balance. Terrain variations within the vital area will often cause more drastic changes in the number of weapons required than variations in vital area size. In mountainous areas, ADA AW positions must not be so high on terrain that aircraft can fly under ADA AW fires due to either troop safety considerations or the depression limit of the weapons.

c. Characteristics of Vital Areas. Characteristics of a vital area which influence vulnerability, such as size, shape, and nature of specific targets within the vital area will affect the manner and order in which the principles of design are applied since the characteristics of a vital area influence the enemy's method and direction of attack. A small vital area will generally require the enemy to use the more accurate delivery techniques. It may require that a single aircraft make several passes at the target, or that the number of attacking aircraft be increased, or both. While small vital areas usually will require a smaller number of ADA AW squads, the squads must be closer to the defended area. Large vital areas, on the other hand, tend to increase the number of enemy attack options, and thereby rapidly increase the number of ADA AW squads required for defense. This is especially true when a large vital area contains several critical point targets. In such a case ADA AW squads may be dispersed within the vital area to defend individual critical point targets. Often, the shape of the vital area will offer the enemy a best direction of attack and will affect the principles of balance and weighting accordingly. In order to increase the chances of success, air attacks against long narrow targets may be flown along the diagonal of the target. Finally, hard vital areas or units will require a smaller quantity of ADA AW squads than soft targets for the same level of air defense effectiveness.

d. Economy of ADA AW Resources. The number of ADA AW squads required for defense of several vital areas can sometimes be

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reduced when the defenses for one vital area begin to develop and offer some protection to another. In such cases, consideration should be given to combining these vital areas and designing an integrated defense which treats the separate installations or units as one single vital area. The resultant relocation of ADA AW squads usually will free some weapons for employment elsewhere. When a defense is so integrated, it should be placed under a single commander.

e. Interrelationships. In practice, the factors which the ADA commander must consider will seldom be clear cut. While each must be judged upon its own merits, it must be considered in comparison with all the others. Their final application usually will be a justifiable compromise that reflects a certain measure of each.

Section III. METHODS OF AIR DEFENSE DESIGN

38. General

The methods and procedures presented in this section provide the ADA AW commander and his staff the basic tools for expeditiously determining the desirable number and disposition of ADA AW squads for each of the force commanders air defense priorities. In general, ADA AW air defenses should consist of no less than four squads. Additional weapons, when required, are added in increments of two. Air defense planning factor tables for the M42 and initial position templates for both the M42 and M55 are provided as guides for initial air defense designs which are then adjusted to maximize application of the principles and factors discussed in paragraphs 36 and 37.

39. M42 Planning Factors Table (PFT)

To assist ADA commanders and staff officers in estimating the number of ADA AW for defense of vital areas (VA) of any shape, the M42 Planning Factors Table (PFT) (table 1) is used as a guide. This table does not apply to march columns or targets of similar shape which dictate basically deployments in a line. M42 defenses are not numerically analyzed. If a stronger defense is desired, more ADA AW squads may be added as indicated by note 3, table 1. The PFT prescribes the number of M42 weapons required for the defense of vital areas having a perimeter up to 38,000 meters. For example, 14 ADA AW squads are required for a vital area with a perimeter of 10,000 meters. For larger VA's than those appearing on the PFT, two weapons are added for each 1,100 meters or fraction thereof.

Table 1. Planning factors table for M42 squads

Perimeter of VA in meters	Number of squads	Perimeter of VA in meters	Number of squads
0– 2,700	4	21,600–22,700	36
2,700– 5,500	6	22,700–23,800	38
5,500– 7,300	8	23,800–24,900	40
7,300– 8,400	10	24,900–26,000	42
8,400– 9,500	12	26,000–27,000	44
9,500–10,600	14	27,000–28,100	46
10,600–11,700	16	28,100–29,200	48
11,700–12,800	18	29,200–30,300	50
12,800–13,900	20	30,300–31,400	52
13,900–15,000	22	31,400–32,500	54
15,000–16,100	24	32,500–33,600	56
16,100–17,200	26	33,600–34,700	58
17,200–18,300	28	34,700–35,800	60
18,300–19,400	30	35,800–36,900	62
19,400–20,500	32	36,900–38,000	64
20,500–21,600	34		

Notes.

1. Maximum mutual support distance: 1,000–1,100 meters.
2. For vital areas with perimeters greater than 38,000 meters, two weapons should be allocated for each 1,100 meters (or fraction thereof) increase in vital area perimeter.
3. For a stronger defense, additional weapons may be used and the distance between fire units decreased.
4. The shape of the defense should conform generally to the shape of the vital area.

40. Initial Position Template

After the number of required ADA AW has been obtained, templates (figs. 17 and 18) are used to locate initial individual weapon positions. The M55 initial position template also indicates the approximate number of M55s needed. These templates do not apply to the planning of march column defenses. The templates place squads in optimum positions for balance and mutual support although no ac-

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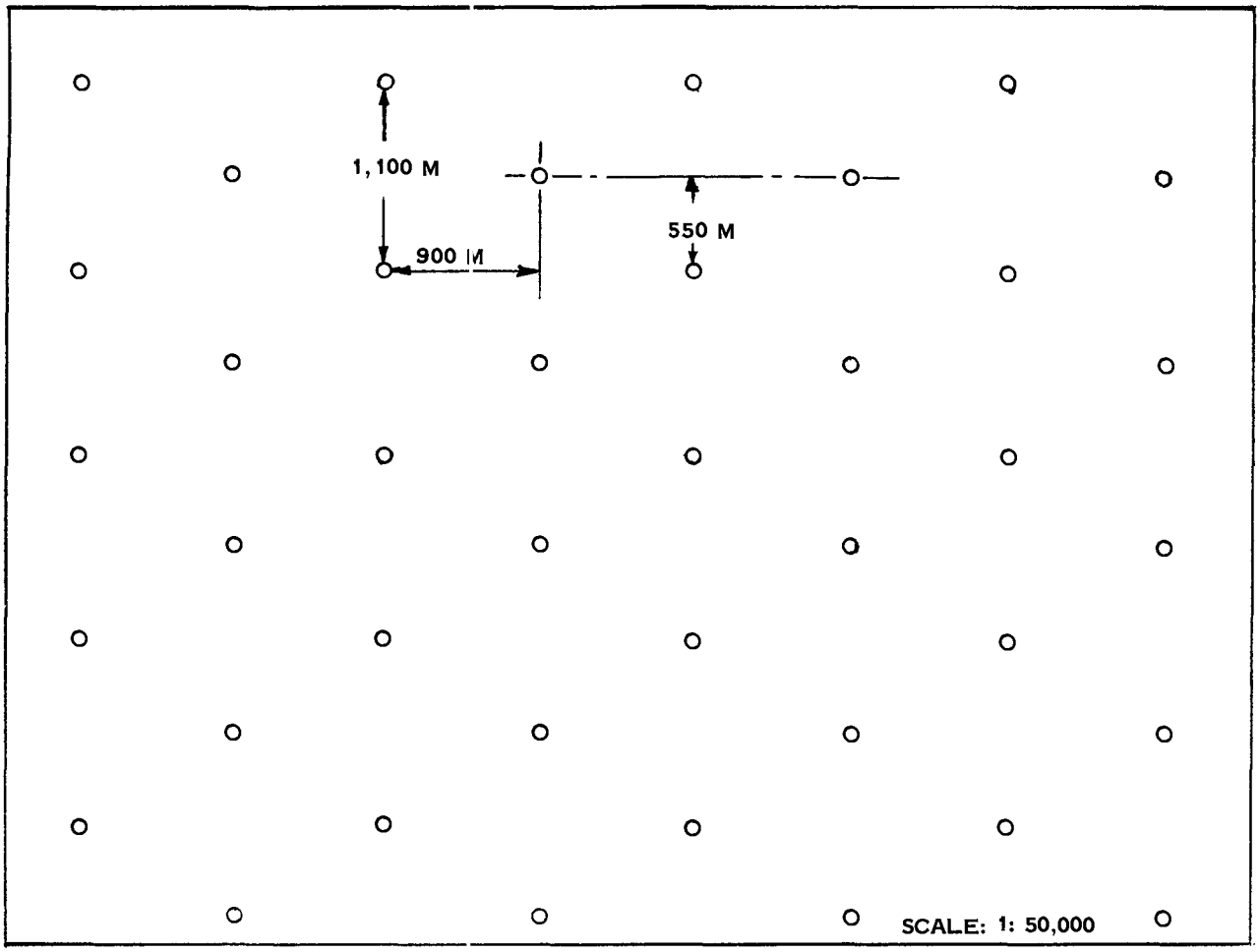

Figure 17. M42 initial position template.

count is taken of terrain features. Normally, positions must be readjusted both on the map and on the ground as the principles and factors discussed above are considered.

a. M42 Initial Position Template (fig. 17).

(1) *Description.* The template is constructed to the scale of the map to be used. Dots representing weapons are arranged in a column 1,100 meters apart with each column 900 meters apart. Every other column is offset toward the top of the template by 550 meters. This will result in a balanced pattern with each weapon being 1,100 meters or less from any adjacent weapon, thereby providing mutual support for each squad from at least two other squads.

(2) *Use of template.* The template shown in figure 17 should be used to assist in initially locating squad positions. Place the template on a map of corresponding scale and move it about so that the maximum number of squads are in or near the vital area. These positions are moved toward or away from the center of the vital area as dictated by the need for early engagement, weighting toward avenues of approach and defense in depth; with due consideration given to the expected threat, the terrain, and the nature of the vital area itself.

b. M55 Initial Position Template (fig. 18).

(1) *Description.* The template is constructed to the scale of the map to be

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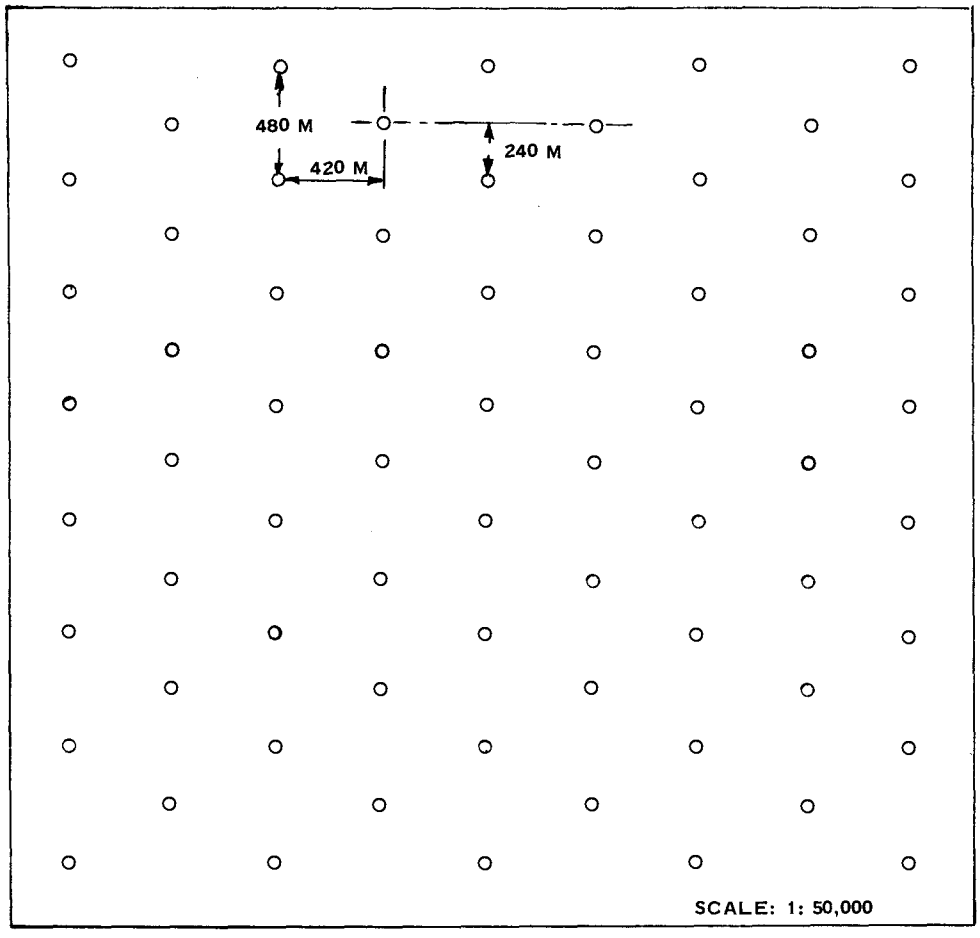

Figure 18. M55 initial position template.

used (usually 1:50,000) by placing weapons in a column 480 meters apart with each column 420 meters apart. Every other column is offset toward the top of the template by 240 meters. This will result in a balanced pattern with each weapon being 480 meters or less from any adjacent weapon, thereby providing mutual support for each squad from at least two other squads.

(2) *Use of template.* The template shown in figure 18 should be used in the same manner as the M42 initial position template.

41. Defense Design Procedure

a. General. The basic steps in designing fixed or semifixed vital area defenses are—

(1) Obtain a suitable map. Generally, a scale of 1:50,000 is best.

(2) Draw the vital area on the map and determine its perimeter.

(3) Determine minimum desirable number of weapons required.

(4) Using initial position template, locate initial weapon positions.

(5) Considering the principles and factors discussed in paragraphs 36 to 37, adjust positions to meet the situation.

(6) Analyze the disposition of weapons after actual occupation of positions, and readjust if necessary.

b. Simple Defense. Figure 19 illustrates the design of a simple defense using the M42 ini-

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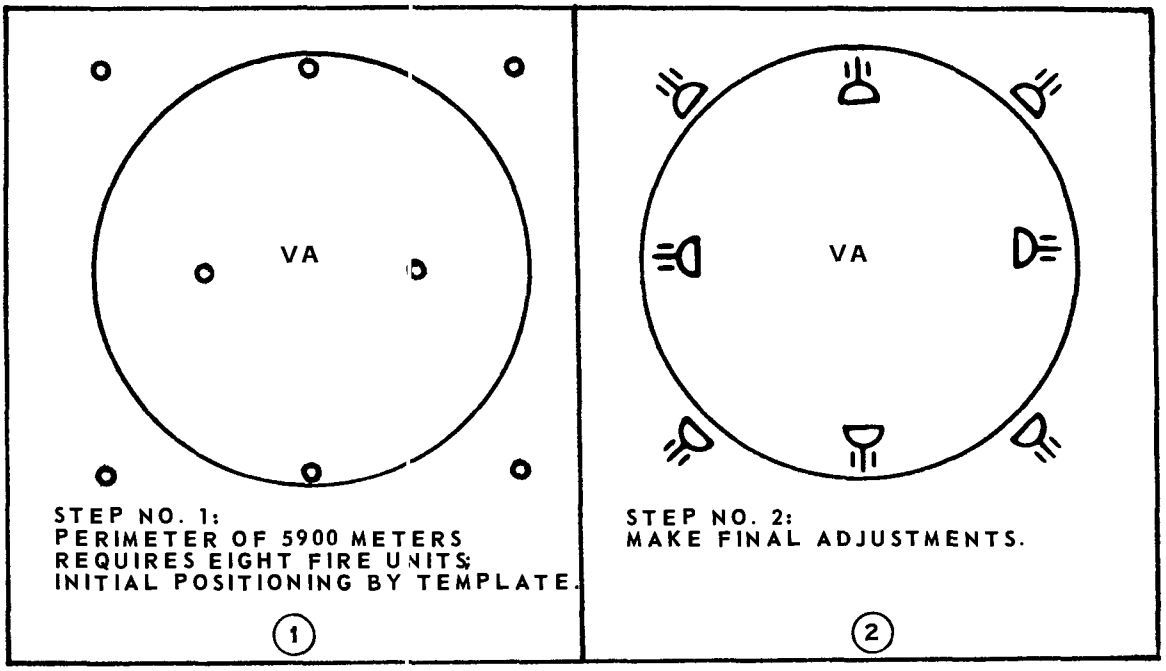

Figure 19. Simple defense.

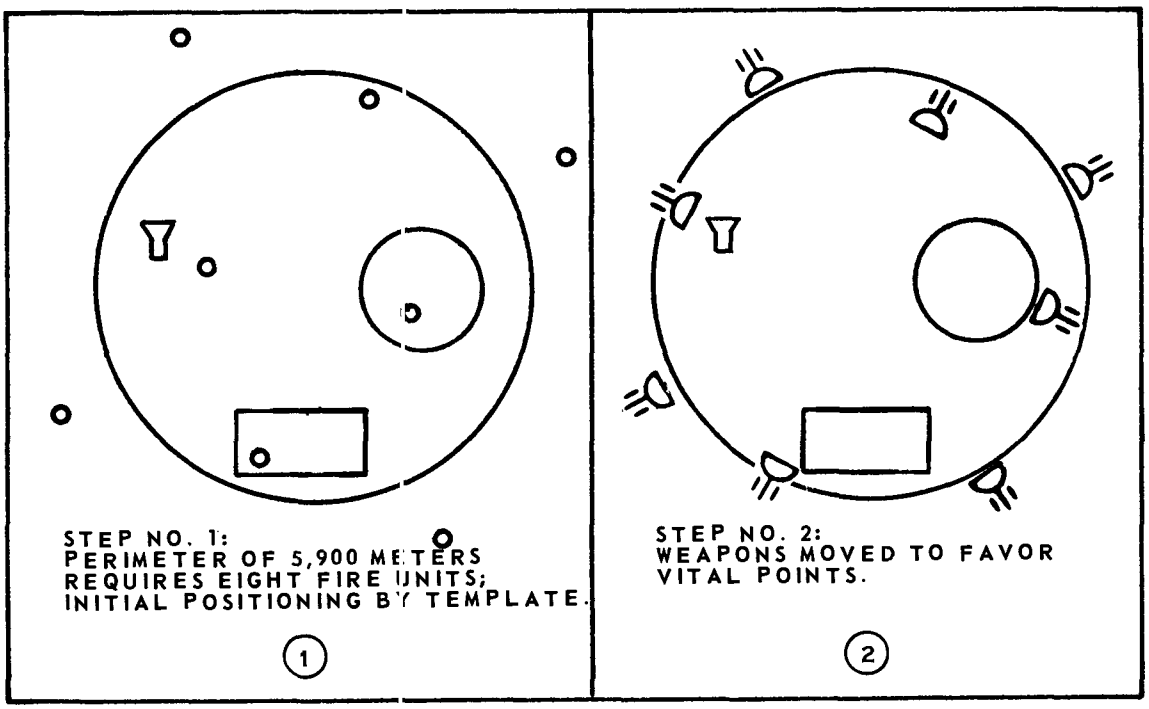

Figure 20. Vital area containing vital points.

tial position template. The steps outlined in *a* above are followed. The same basic procedure is applicable to defenses involving the special considerations noted in the following paragraphs.

c. Vital Points Within the Vital Area. The first special consideration arises when several vital points are within the vital area. It is probable that within a fairly large vital area there

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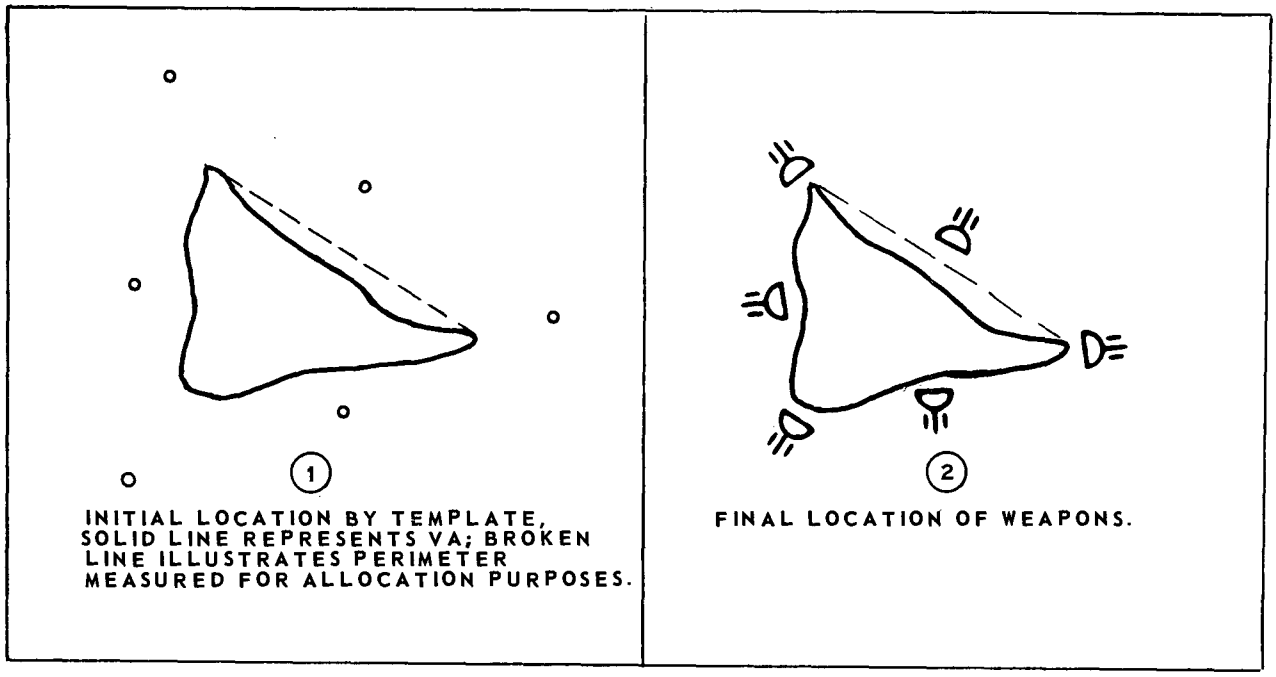
1
INITIAL LOCATION BY TEMPLATE, SOLID LINE REPRESENTS VA; BROKEN LINE ILLUSTRATES PERIMETER MEASURED FOR ALLOCATION PURPOSES.
2
FINAL LOCATION OF WEAPONS.

Figure 21. Design of defense for noncircular vital area.

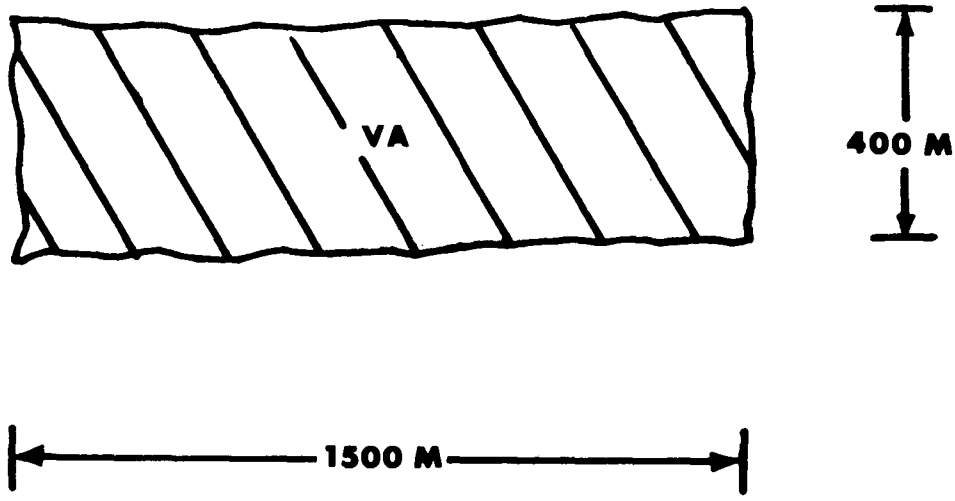

Figure 22. Defense design of an elongated vital area (PFT solution).

will be certain points of a higher priority than others (fig. 20). In such cases, weapons are emplaced using the template to defend all vital points; i.e., adjust the template initially to favor the vital points. Any weapons that must be moved because of terrain difficulties, or for other reasons, should be moved toward the more important points.

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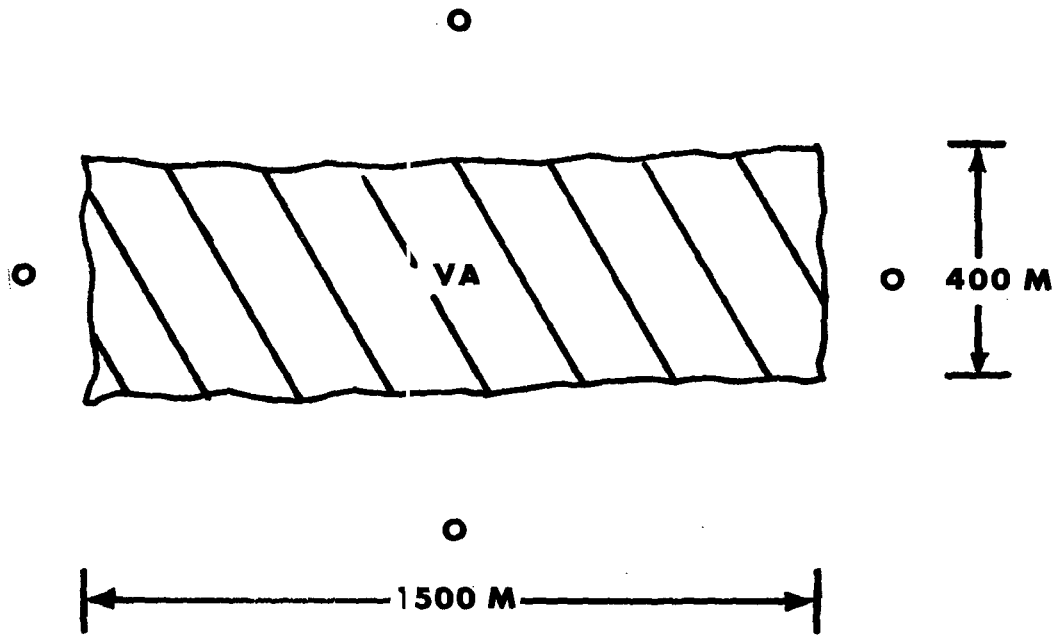

Note: 4 weapons required using initial position template.

Scale 1:50,000

Figure 23. Defense design of an elongated vital area (template solution).

d. Noncircular Vital Areas

(1) When designing the defense of a noncircular vital area, the defense generally should conform to the shape of the vital area. After defining the VA on a suitable map, determine the perimeter of the vital area. If the vital area outline has an exaggerated indentation that gives a false picture of the total area to be defended, measure the perimeter assuming the indentation does not exist. Using the perimeter so obtained, determine the number of weapons required, using the PFT. Next, place the M42 template on the map, and adjust it to provide the best defense for the number of weapons being used as illustrated in figure 21. The same general procedures apply to the M55.

(2) A long, narrow vital area can be defended with fewer weapons than required by the PFT. As an example, consider a vital area 1,500 meters long and 400 meters wide, with a perimeter of 3,800 meters (figs. 22 and 23). The PFT calls for 6 M42 weapons while the initial position template suggests that 4 weapons might be sufficient. This type configuration of a vital area may be defended by fewer weapons than indicated by the PFT. The same general procedures apply to the M55.

e. Integrated AW Defense. M42 defenses may be integrated with each other when the near edges of separate vital areas are within 1,300 meters of each other (fig. 24). If the near edges of the vital areas meet this criteria, the defense is designed as a single defense by establishing a common perimeter for the vital areas. The original vital areas may be considered as vital points within the overall vital area. The same general procedures apply to the M55, except that the distance between separate VA's must not exceed 700 meters.

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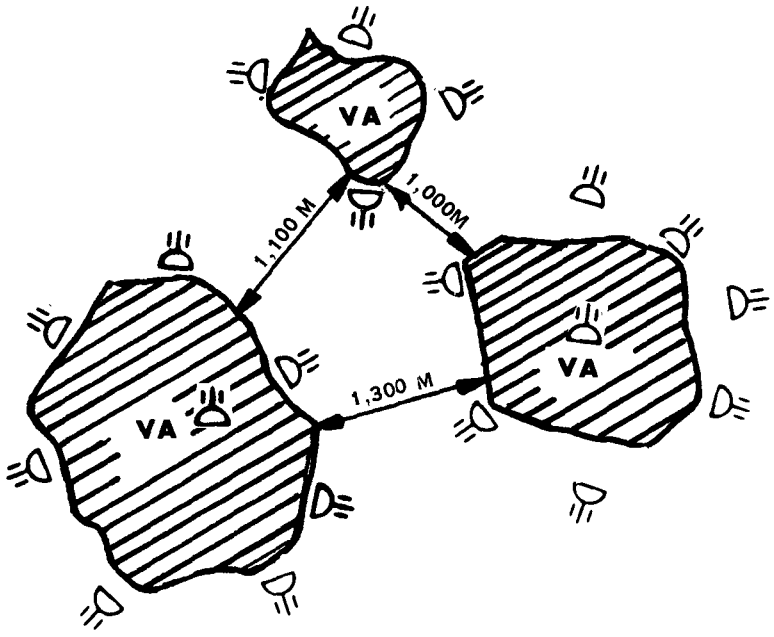
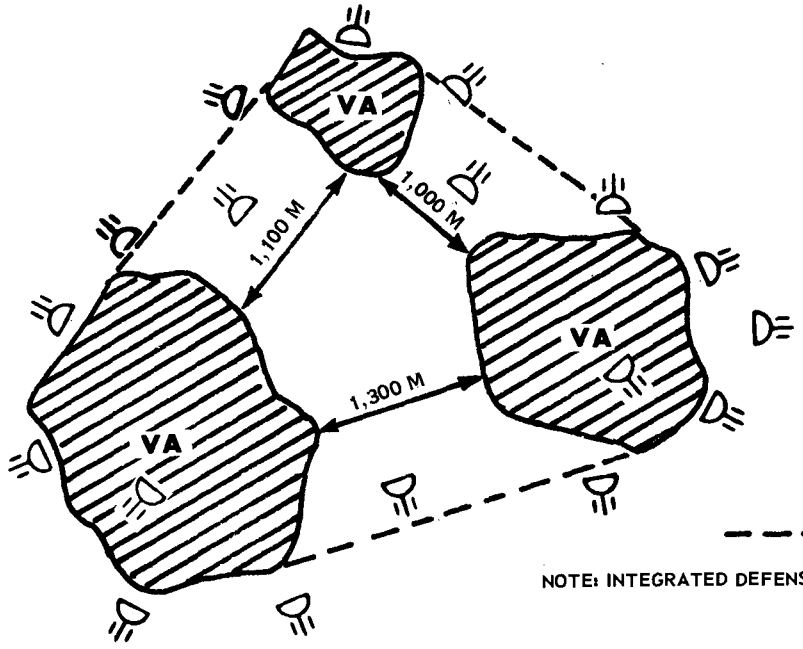


(1) SEPARATE M42 DEFENSES



NOTE: INTEGRATED DEFENSE REQUIRES 2 WEAPONS LESS

(2) REDEPLOYMENT TO FORM INTEGRATED DEFENSE

Figure 24. Integrated ADA AW defense.

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f. Routes of Approach. Routes of approach fall into two general categories, probable and forced.

(1) A probable route of approach is one that the enemy is likely to use but is not restricted to. The pilot of an aircraft traveling at 500 knots and 150 meters above the ground can see little detail on the ground. He can, however, see large objects such as highways, rivers, and mountain ranges, and he may use them to assist in navigation. If such landmarks lead to the vital area, they may be considered as probable routes of approach. In designing the defense, the template should be used in the normal manner except that it should be turned to locate as many weapons as possible toward the probable route. If this process does not provide the desired degree of weighting, more weapons should be provided. Lacking additional weapons, some of the available weapons may be relocated toward the probable route at the expense of some balance.

(2) A forced route of approach is one that the attacker is compelled to use. Balance is disregarded when designing the defense for a forced route of approach and the defense is hand-tailored to fit the situation. Figure 25 illustrates a forced route of approach with a typical defense design.

42. Typical Vital Area Defenses (M42)

a. Air Defense of Field Artillery. Field artillery batteries are *normally* defended by four or more ADA AW squads deployed to the rear and flanks of the defended unit's sector of fire. This pattern is based upon the *usual* location of field artillery firing position on line and in defilade. The air defense pattern is altered in accordance with the principles of defense design as variations in field artillery position areas occur. Thus, situations may occur where ADA AW squads may, of necessity, be forward

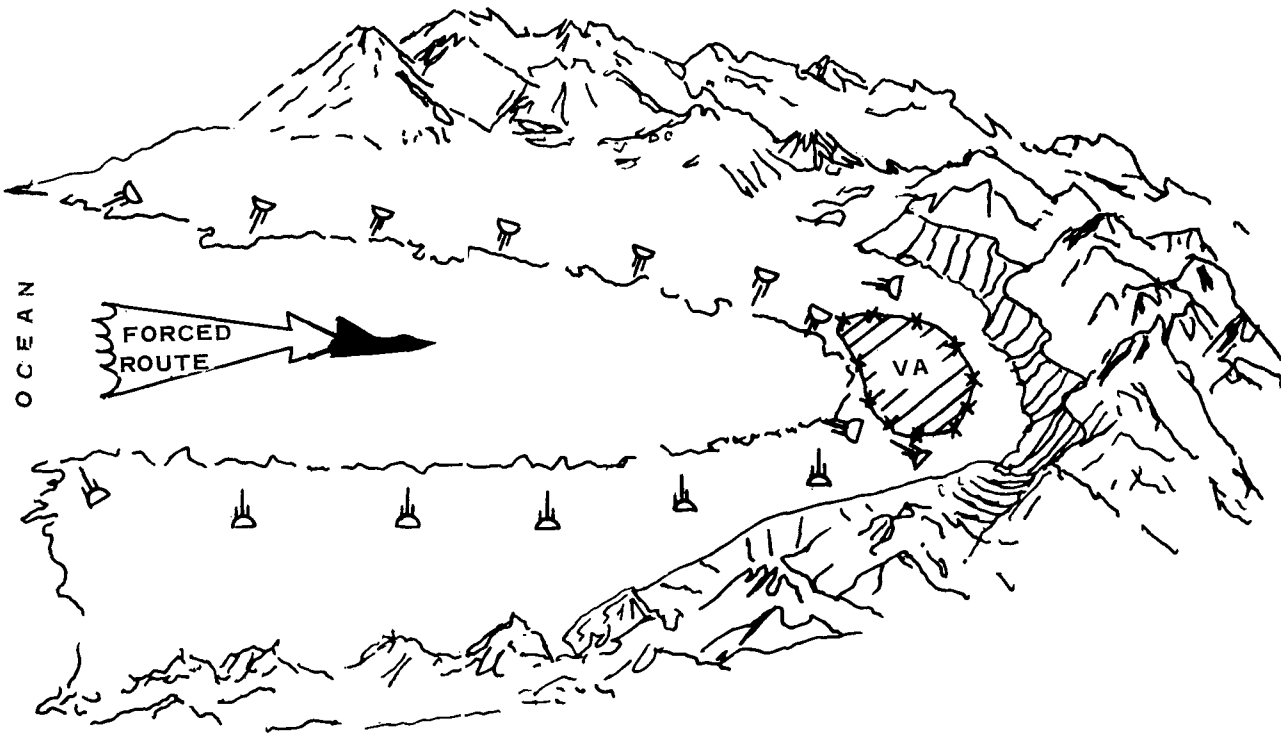

Figure 25. Forced low altitude route of approach.

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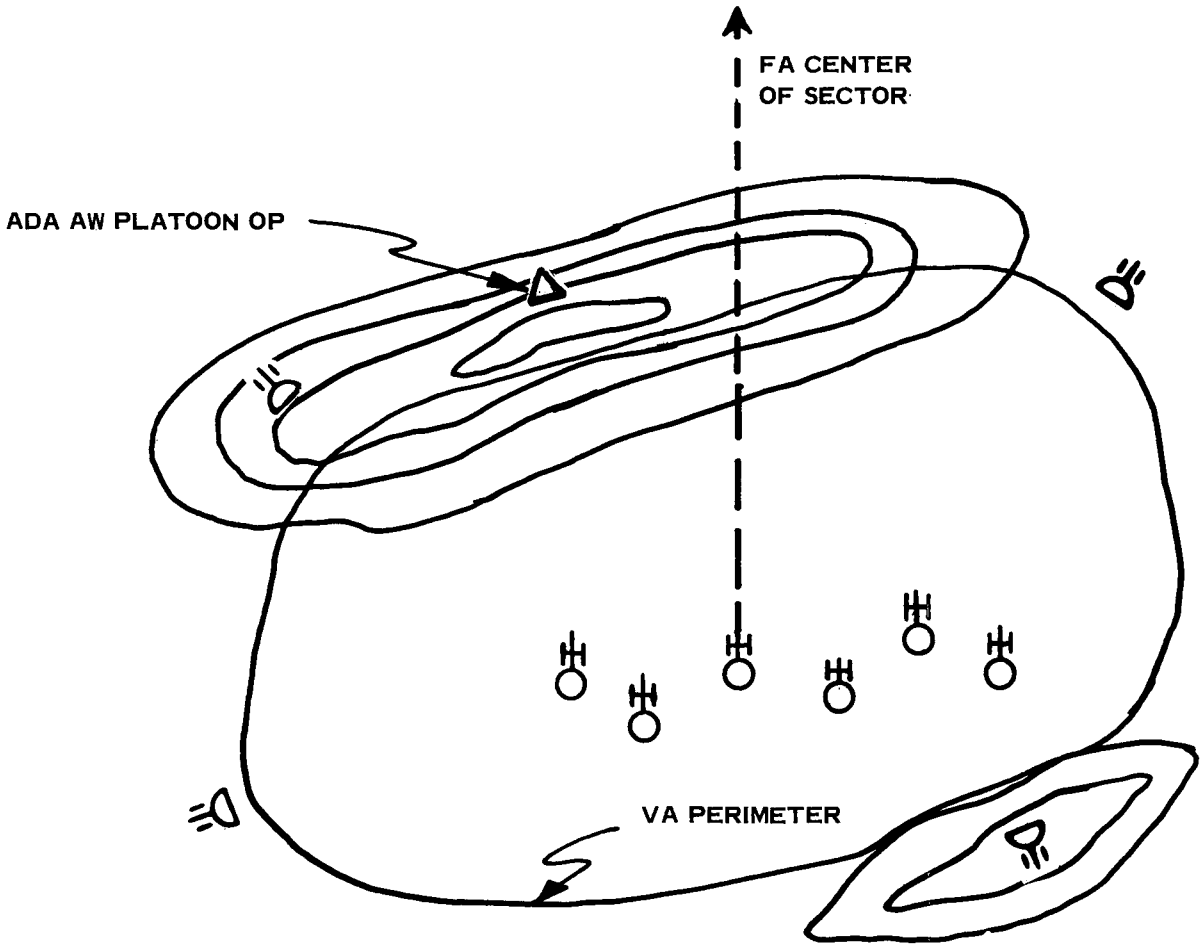

Figure 26. Typical ADA AW defense of field artillery position.

of the field artillery weapon positions. A type defense of cannon artillery is illustrated in figure 26. If nuclear weapons are involved, the defended unit commander may desire both the special ammunition and the delivery means defended. This usually will increase the number of ADA AW squads required, depending largely upon whether or not the special ammunition must be treated as a separate vital point or can be defended as a part of the field artillery position area. Field artillery missile or rocket launchers may be deployed from hide positions to firing positions which are vacated after the mission is fired. Plans should be made for the defense of such launchers in each position and during movements between position.

b. Air Defense of SAM Units. The combination of enemy tactics, terrain, and high value of SAM units in the air superiority battle may often require employment of ADA AW elements to defend these units againt low level attack. Primary factors determining the number of ADA AW elements assigned this mission are availability of weapons, the low altitude threat to SAM units, the level of defense desired, and terrain. The ADA AW squads may be deployed to form a balanced defense with the SAM unit being the vital area; however, a defense weighted toward probable or forced avenues of approach through areas masked from radars may be more appropriate. Figure 27 illustrates the latter type deployment, where a M55 section and a M42 battery are positioned to provide low altitude defense and to enhance ground security. Early warning and close coordination be-

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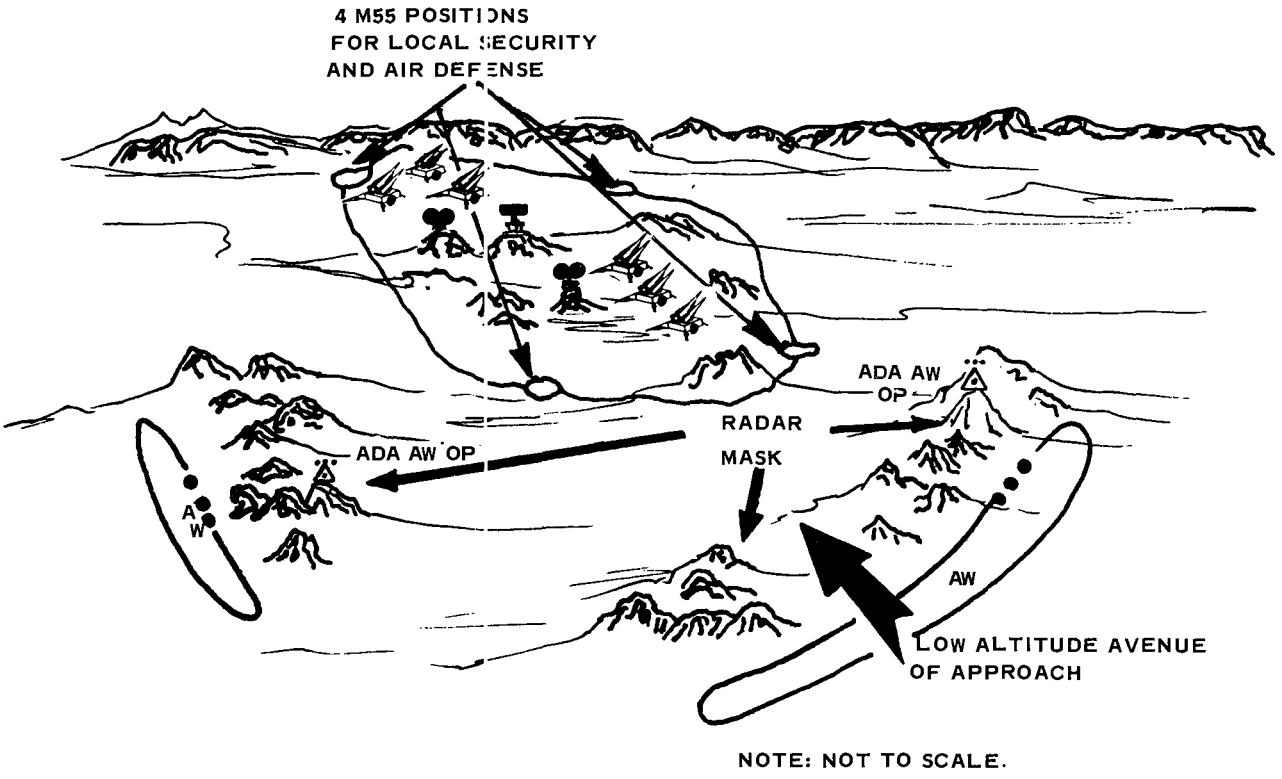

Figure 27. Type defense of a Hawk battery.

tween the SAM battery and ADA AW elements must be maintained.

c. Defense of an Airfield. Figure 28 depicts an example wherein a M55 section, a M42 battalion and a Hawk battery are deployed to defend an airfield. A balanced vital area defense may be more common in this situation; however, this example illustrates utilization of M42 platoons to cover radar mask areas and the M55 section utilized as self defense for a Hawk battery. The command and control procedures outlined in chapter 3 apply.

43. Typical Defenses of Moving Units

a. General. ADA AW units are capable of providing air defense protection to units or installations while the latter are displacing. Defended units or installations may displace or be displaced in one or more echelons. The actual movement may be by march columns of varying length and composition, or by infiltration. Planning and deployment of ADA AW elements must provide for continuous air defense coverage throughout the displacement.

b. Defense of March Columns.

(1) *M42 planning.* The front and rear of a column is weighted with ADA AW squads in order to maximize the principles of early engagement and defense in depth along the most likely and advantageous attack avenues for hostile aircraft. The number of ADA AW squads required for march column defense is based upon road space.

(*a*) To insure that aircraft approaching the head or rear of the column are engaged as soon as possible with a maximum of firepower, the AD planner should employ three ADA AW squads in the first 1,200 meters of the column. One squad is placed about 100 meters behind the lead vehicle. The next squad is placed about 550 meters behind the

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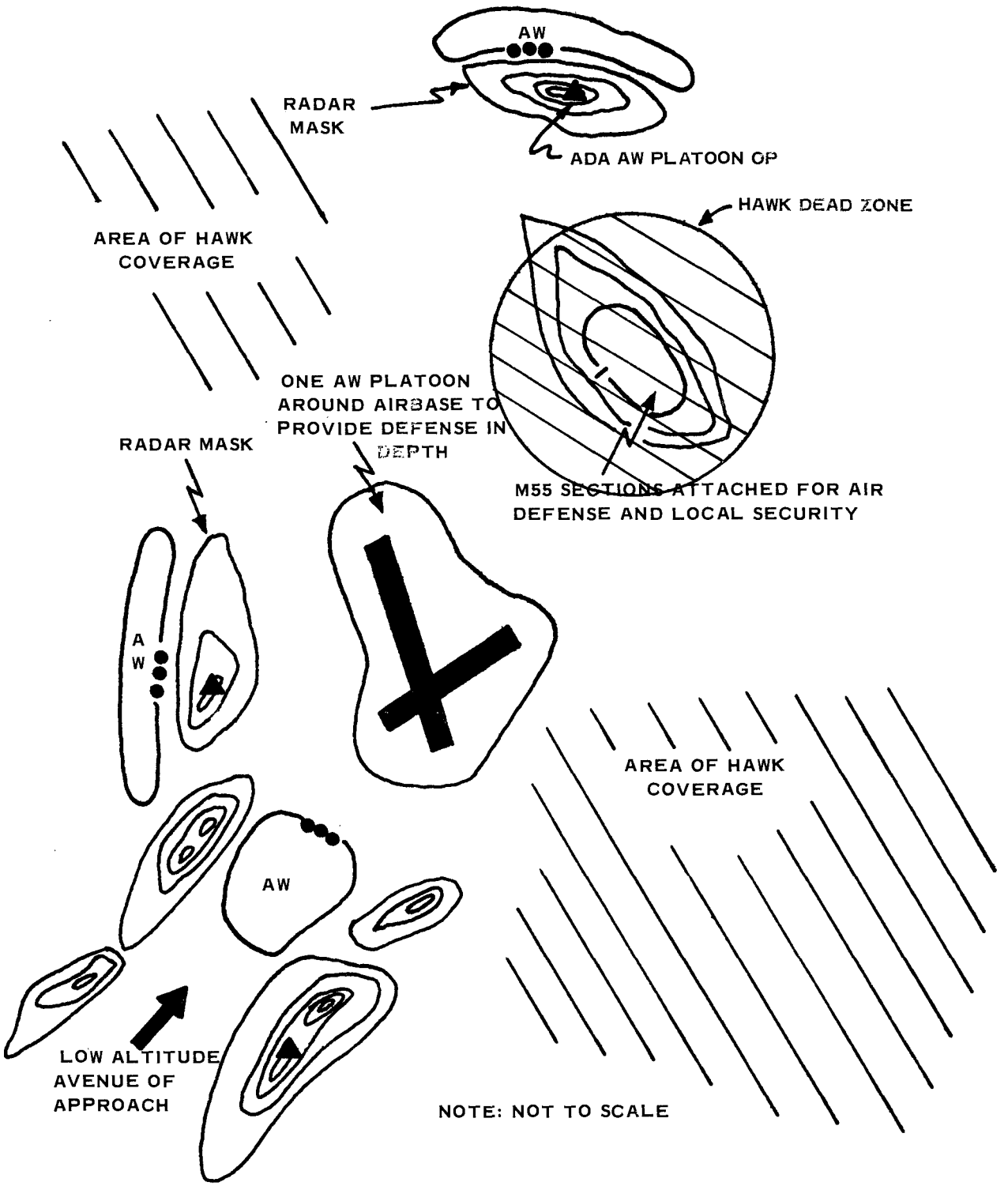

Figure 28. Type defense of an airfield.

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second. The rear of the column receives the same consideration as the front.

(*b*) The remainder of the column is divided into 1,100 meter increments. One squad is allocated for each remaining 1,100 meters of road space. If the total number of squads computed is an odd number, add one to the center portion of the march column.

(*c*) When the column comes under air attack, the column commander may elect to continue movement on the road, or disperse the column on either side of the road. Although the M42 is capable of firing while moving its effectiveness is decreased. The commander of the attached ADA AW units should inform the convoy commander of this limitation in order to determine the proper action to be taken by M42 squads. If the convoy is to continue moving, a compromise may be arranged whereby M42's halt long enough to conduct an engagement.

(2) *M55 planning*. The same basic procedure is used to determine the number of M55 squads required for march column defense, allowing for variation due to the lesser weapon range.

(*a*) Three squads are deployed in the first 600 meters of the march column. This is accomplished by placing one squad about 100 meters behind the lead vehicle. The next one is placed about 250 meters behind the first and the last is placed about 250 meters behind the second. The rear of the column receives the same consideration as the front.

(*b*) The remainder of the column is divided into increments of 500 meters. One M55 fire unit is allocated for each remaining 500 meters of road space. If the total number of squads computed is an odd number, add one additional squad to the center of the march column.

c. Defense of Infiltrative Units. Units moving by infiltration may not require any defense since this method of displacement does not usually present lucrative targets to enemy aircraft. Sometimes, however, the volume of units infiltrating over certain routes may become heavy enough to produce such a target and an attendant need for AD protection. In these instances, ADA AW squads may be stationed in suitable positions along the entire route or along the more exposed sections thereof. Spacing between positions should be as near as possible to that used in march column defenses. ADA AW squads can move with initial infiltrating elements, occupy preselected positions in order of arrival, depart the positions as the last vehicles pass. Another method is to deploy ADA AW squads along the route prior to the heavy increase in traffic over the route.

d. Air Defense of Maneuvering Armor Elements. ADA AW elements may be attached to armor units to provide air defense. Armor operations are characterized by fire and movement. They advance as rapidly as possible, in mass, and by continuous or echeloned moves. ADA AW squads may be required to provide air defense for elements serving as the base of fire, for maneuver elements during their advances and consolidation of the objective, or both. Air defense for the base of fire elements is provided in essentially the same manner as for a cannon artillery battery position. Air defense for maneuvering elements is provided as long as possible from positions along the line of departure (LD) which permit engagement of aircraft attacking the maneuver elements during the advance to, assault on, and occupation of the main objective. Preselected positions beyond the LD should be occupied as soon as possible to maintain and improve coverage. However, deployment beyond the LD increases the exposure of ADA AW, which are more vulnerable than tanks to all types of enemy ordnance, especially when in suitable air defense positions. Consequently, the displacement of

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ADA AW squads forward to defend maneuvering elements should be accomplished by echelon a short distance behind the advance. ADA AW squads may locate themselves in defilade a few yards from good air defense positions to reduce their vulnerability to enemy fire. These positions are occupied at the first indication of air attack. Defilade positions degrade but seldom preclude engagement of aircraft. Ground fires from air defense positions are delivered as a matter of self defense. However, since unarmored antitank weapons such as rocket launchers pose a serious threat to maneuvering armor, the force commander may find it desirable to assign a ground support role to some of the ADA AW squads available.

44. Special Deployment

The establishment of "flak traps" can be an effective use of ADA AW when the enemy indicates definite interest in the attack of certain units or installations or the suppression of SAM system defenses. Surprise, high mobility, and massing of ADA AW fires is essential in using this tactic. Dummy and/or decoy positions may be used both to bait the trap and to enhance the survivability of actual units or installations.

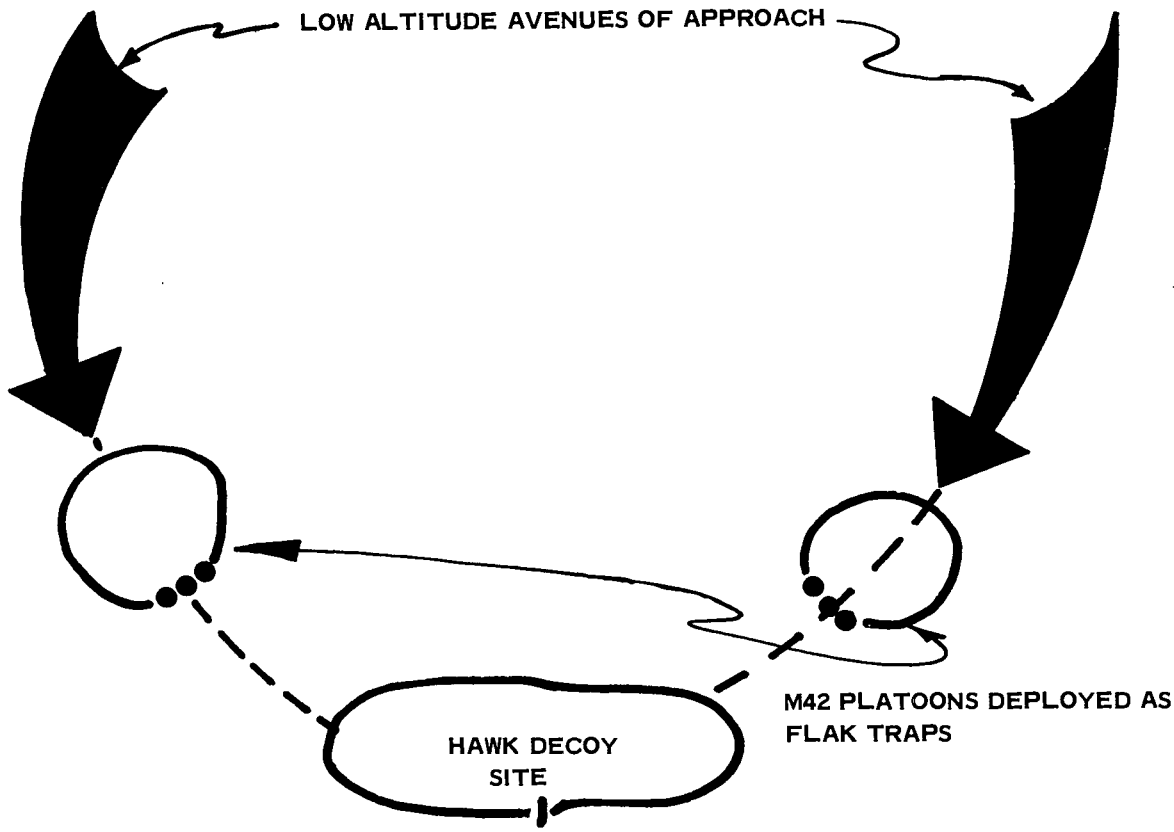

Figure 29. Decoy SAM position and M42 flak trap positions.

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CHAPTER 5

RECONNAISSANCE, SELECTION AND OCCUPATION OF POSITION

Section I. GENERAL

45. Introduction

Since the primary role of ADA AW units is to provide low altitude air defense, the procedures for reconnaissance, selection, and occupation of position are discussed in this chapter with this role in mind. In the absence of any air threat, or when supported commanders are faced with such a ground threat as to require disregarding the air threat, ADA AW (M42) units may be employed in the gound support role, and procedures and siting criteria are modified accordingly (para 64–71). The M55 battery is not normally assigned a primary ground support role but always is integrated into the perimeter defense of the defended unit.

46. Reconnaissance

Reconnaissance is the examination of terrain as a basis for the selection of positions from which weapons and troops can best accomplish the mission. Some of the factors for consideration are location and boundaries of the defended installation or unit; fields of fire, battalion radar sites; aircraft ground observer positions; access routes to, from and within the position area; routes of communication; communication capability; location of friendly and enemy troops; probable enemy observer positions; communications and electronic security; and local security. Reconnaissance should be carefully planned, and the reconnaissance party should be limited to the personnel and vehicles actually required. The reconnaissance for and the selection of the positions are normally accomplished by the commander, together with his subordinate commanders. Types of reconnaissance that may be used are—

a. Map Reconnaissance. As a minimum, RSOP requires a map reconnaissance. Ideally, map reconnaissance serves as a basis for planning and conducting a more detailed ground or aerial reconnaissance. Map reconnaissance often will be the only means used by the battalion commander since ADA AW units often operate over large areas and in fluid combat situations. A map reconnaissance, being general in nature, should be followed by a detailed ground and/or aerial reconnaissance by lower echelons whenever time permits.

b. Ground Reconnaissance. This method provides the best, most detailed examination of routes and potential position areas. It should be employed by commanders at all levels as an essential follow-on to the map reconnaissance unless time does not permit.

c. Aerial Reconnaissance. Weather and the situation permitting, this method may be used advantageously by commanders to refine map reconnaissance. Aerial reconnaissance is faster and permits greater area coverage than ground reconnaissance, but it does not provide the detailed information obtainable by ground reconnaissance.

47. Selection of Position

Factors affecting the selection of position areas are the mission, the size of the defended area, the terrain and weather conditions, weapons characteristics, and the tactical situation. Position areas which afford communications and electronic equipment security, concealment, defilade for nonfiring elements, sufficient space to disperse installations, and terrain suitable

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for ground defense of the unit are desirable, but the essential requirement of a position is that it permit the unit to accomplish its mission. Thus, for ADA AW, field of fire is a governing consideration. A 6400‰ (360°) field of fire for defense against the air threat habitually should be sought for each weapon.

48. Classification of Position Areas

Air defense artillery positions are classified tactically as primary, alternate, supplementary, dummy and decoy.

a. A *primary* position is one from which the unit intends to accomplish its tactical mission. Each such position should be improved for permanent occupancy to the degree that time permits even though the tactical situation may necessitate displacement at any time.

b. An *alternate* position is one to which the ADA AW unit moves when the primary position becomes untenable or unsuitable for carrying out its task. Therefore, it should meet all the requirements of the primary position. The alternate position should be close enough to the primary position to permit rapid displacement but distant enough to prevent its being rendered untenable by the same action that affects the primary position. At least one alternate position area should be selected for each primary position, and all preparations necessary for occupation should be made consistent with the time available.

c. A *supplementary* position is a position for firing on targets that cannot be effectively fired upon from the primary position. When an ADA AW squad moves from a primary air defense firing position to another position which improves the capability to engage ground targets, it is moving to a supplementary position. This will happen often when ADA AW squads defending units or installations adjust their locations at night to improve the local security of the area.

d. A *dummy* position is one that is designed to resemble a real AD position. They are designed to mislead the enemy as to the location and number of air defense units. Dummy positions are constructed as part of an overall deception plan. Engineer units may construct and move dummy equipment as required to counter enemy intelligence systems in consonance with the force commander's plans for counterintelligence and deception. Utilization of ADA AW dummy positions should be tactically integrated with utilization of the actual ADA AW position.

e. A *decoy* position is very similar to a dummy position. The difference is only in purpose and degree of authenticity. A decoy position is intended to cause the enemy to commit an action which will result in an advantage to friendly forces. For example, a decoy installation may be constructed with the objective of enticing the enemy to mount an air attack against it; the enemy aircraft may then be surprised and destroyed by well hidden weapons. Engineer units may construct and move decoy equipment as required to counter enemy intelligence system in consonance with the force commander's plans for counterintelligence and deception. Utilization of ADA AW decoy positions should be tactically integrated with the utilization of the actual ADA AW positions.

49. Occupation

The actual occupation of the position area should be orderly, rapid, and quiet. Insofar as possible it should conform to unit SOP. Speed is obtained by planning and organization, a high degree of training, good reconnaissance, careful selection of the position area, and briefing of the occupation plan to include at least one member of each squad. Actual occupation of position is directed and supervised by the local commander or executive officer. Primary weapons are emplaced first. Positions are improved progressively as time permits. When possible, position signature, such as altered vegetation and track marks, should be prevented or eliminated. When permitted by the tactical situation, occupation of position should be conducted under cover of darkness.

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Section II. SEQUENCE OF RECONNAISSANCE, SELECTION AND OCCUPATION OF POSITION

50. General

The sequence of reconnaissance, selection and occupation of position is generally the same for all units. The requirement to displace may be caused by a change in mission, changes in the tactical situation, or displacement of the defended unit. In the following discussion the sequence considers an entire battalion displacement so that functions of all commanders and staff elements may be described. This is considered an ideal case, since the tactical situation normally will require independent battery or platoon RSOP to establish defenses.

51. Planning the Displacement

When the battalion commander receives a mission order requiring displacement, he should issue a warning order to the batteries and instruct the staff to begin preparation of implementing orders and instructions. The S3 should begin preparation of defense design, based on map reconnaissance and the mission, so that battery areas may be designated and overlays given to battery commanders along with the orders to displace. Battery commanders are then called to the battalion CP or instructed to meet at a designated location to receive the order. The order should be framed in normal operation order form insofar as possible. It should contain, but not be limited to, the tactical situation; position areas for batteries to include tentative map locations of each primary weapon; time of movement; local security instructions; order of march; administrative arrangements; and communication instructions. Road priorities and the tactical situation may dictate that the battalion commander limit the number of vehicles in battery reconnaissance parties, but normally the composition of the reconnaissance party is a matter of SOP. This reconnaissance party is established for a battalion controlled RSOP which will rarely occur, however it applies equally well to battery and platoon independent operations by deleting the headquarters elements. Headquarters elements may also utilize this type partly when they displace independently. The battalion commander visits all positions (64 AW squads) only if conducting a very, very deliberate occupation. The battery commander visits all positions (16 AW squads) only when time permits. The normal situation is a decentralized RSOP with platoon or squad leaders selecting exact position on the ground. Reconnaissance party may include the following personnel.

a. Headquarters Staff.

Battalion commander.
S3.
S1.
Communications officer.
Headquarters battery commander.
Communication personnel.
Representatives from all major staff sections.
Selected personnel for ground security and guides.

b. Automatic Weapon Battery.

Battery commander.
Communication personnel (including wiremen).

c. Automatic Weapons Platoons.

Platoon leader or assistant platoon leader.
Platoon sergeant.
Representative from each squad.

52. Receipt of Orders from the Battalion Commander

a. Before he leaves the battery to report to the battalion commander for movement orders, the battery commander issues instructions covering operations during his absence. He tells his executive officer (in the case of headquarters battery, the first sergeant) where he is going, when he expects to return, and as much as he knows of the situation.

b. When the battery commander and his party approach the place where the battalion commander's orders are to be received, the battery commander halts the party, directs dispersion and concealment of the vehicles, and reports to the battalion commander.

53. Planning the Reconnaissance

The commander's task in getting his unit into

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position includes reconnaissance for, and selection of, locations for each automatic weapon squad and command and logistic installations; formulation of an occupation plan; issuance of orders to carry out the plan; and supervision of the execution of the plan. The methods of accomplishing these tasks vary according to the time available and composition of the reconnaissance party. When there is sufficient time, the area should be reconnoitered in detail by the commander. When there is little time, the commander must appoint members of his party to perform portions of the reconnaissance. A position for an installation may be selected initially by any designated member of the party, but the position finally occupied must be approved by the responsible commander. In planning his reconnaissance, the commander considers the following:

a. Current mission requirements.

b. New mission requirements.

c. Distance and route to the new area.

d. Personnel available and additional personnel required.

e. Vehicles and equipment required for the reconnaissance and for early preparation of the position (e.g., commo and pioneer equipment).

f. Siting requirements for radar and communications equipment.

g. Size, location and characteristics of the defended unit or installation.

h. Location for each automatic weapon squad, observer, motor park, CP, ammunition, mess and POL facilities.

i. Time available.

j. Tactical situation.

k. Ground security requirements.

54. Executing the Reconnaissance and Selection of Positions

a. After receiving the order, the battery commander assembles his party, explains the situation, shows the new map location and route to his party, and proceeds to the new area accompanied by his party. On the way he notes the condition of the route and considers the use of route markers. If the ADA AW unit is to defend a unit during the march and static positions or road guides along the route are required, these weapon positions are selected and guides are positioned.

b. On arrival at the area, the battery commander makes a general survey of the area and assigns portions of the reconnaissance mission to the members of his party. Before leaving the area or issuing his orders, the battery commander receives recommendations for the locations of battery installations and considers them for use in his plan.

55. Planning the Occupation

a. It is desirable to have a guide lead each vehicle to its place, especially during darkness. If personnel are not available, signs may be used. The guides expedite the movement of vehicles from the column to their selection position in the battery area without halting the column or delaying the prompt clearance of the road.

b. Separate entrance and exit routes are desirable. When available, established roads and trails should be used. The entrance to the bivouac area of the headquarters battery should be located so that vehicles do not pass through the command post (CP) area.

Section III. THE HEADQUARTERS AND HEADQUARTERS BATTERY

56. General

a. Procedures for positioning the elements of the command post and in organizing the position vary and depend on the following:

(1) *Policy of the commander.* Normally, the battalion commander will direct the headquarters battery commander or the S1 to organize the headquarters area. The S1 and the headquarters battery commander must know the

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desires of the commander. The initial reconnaissance may be made by the battalion commander or his designated representative, normally the S3, who will select tentative locations for the various installations.

(2) *Staff section requirements.* The headquarters battery commander and S1 should know the type of location required by each staff section to insure efficient operation, and should understand the relationships among the various elements of the headquarters.

b. After an SOP has been developed, the same general layout of the headquarters should be used in each position. Preserving the same relationship of positions of the installations will result in greater efficiency of operation.

57. Characteristics of Position Areas

a. General. In planning the organization of the area, the commander considers the space available; cover and concealment; security; communication with superior, subordinate and supported units; routes; and requirements of headquarters battery for mess, maintenance and bivouac area.

b. Space Requirements. The location of the battalion CP normally is governed by the location of a suitable radar and communication site. Except as varied by the policies of the commander, the space requirements for battalion CP's depend on the organization of the Army air defense command post (AADCP) and the location of the surveillance radar. If separate location is required for the surveillance radar and other AADCP installations, the headquarters battery area responsibility will be larger and special consideration must be given to local security and messing arrangements for this section. In evaluating the space available, locations are considered for the following elements:

(1) Location of the surveillance radar.
(2) Radio sets.
(3) Army air defense command post (AADCP) (S2, S3).
(4) Administrative command post (S1, S4).
(5) Vehicle park near message center for visitors' vehicles.
(6) Headquarters battery installations and bivouac area.
(7) Local security elements.

58. Receipt of Orders

If the entire battalion is to displace, the headquarters battery commander and the staff receive their orders at the same time that orders are issued to the automatic weapon battery commanders.

59. Selection of Positions

a. Headquarters Area. The battalion commander selects the general location of the battalion headquarters area and should also conduct a reconnaissance to determine the location of the surveillance radar. The surveillance radar may normally be collocated with the AADCP since the radar is an integral part of this operation. On the other hand a good radar location is not always compatible with the requirement for cover and concealment of other headquarters elements. In this case the radar may be located displaced from the primary headquarters area, including the AADCP. The displacement distance of the surveillance radar should not be excessive since the normal communication link with the AADCP is wire. The local security and messing requirements for the radar section are also complicated by excessive distances from the headquarters area.

b. Surveillance Radar. The primary consideration in selecting the location of the surveillance radar is the capability of achieving the desired degree of coverage. As a rule, the surveillance radar should be emplaced on dominant terrain and the site should have a good radar reflecting surface. The best ground reflecting surface is one which is flat and free of wooded areas and manmade objects.

c. Ground Aircraft Observers. Ground aircraft observer locations are selected to complement the coverage of the surveillance radar. Each location is selected by the S2, normally by map reconnaissance and refined as time permits based upon reports from the observers

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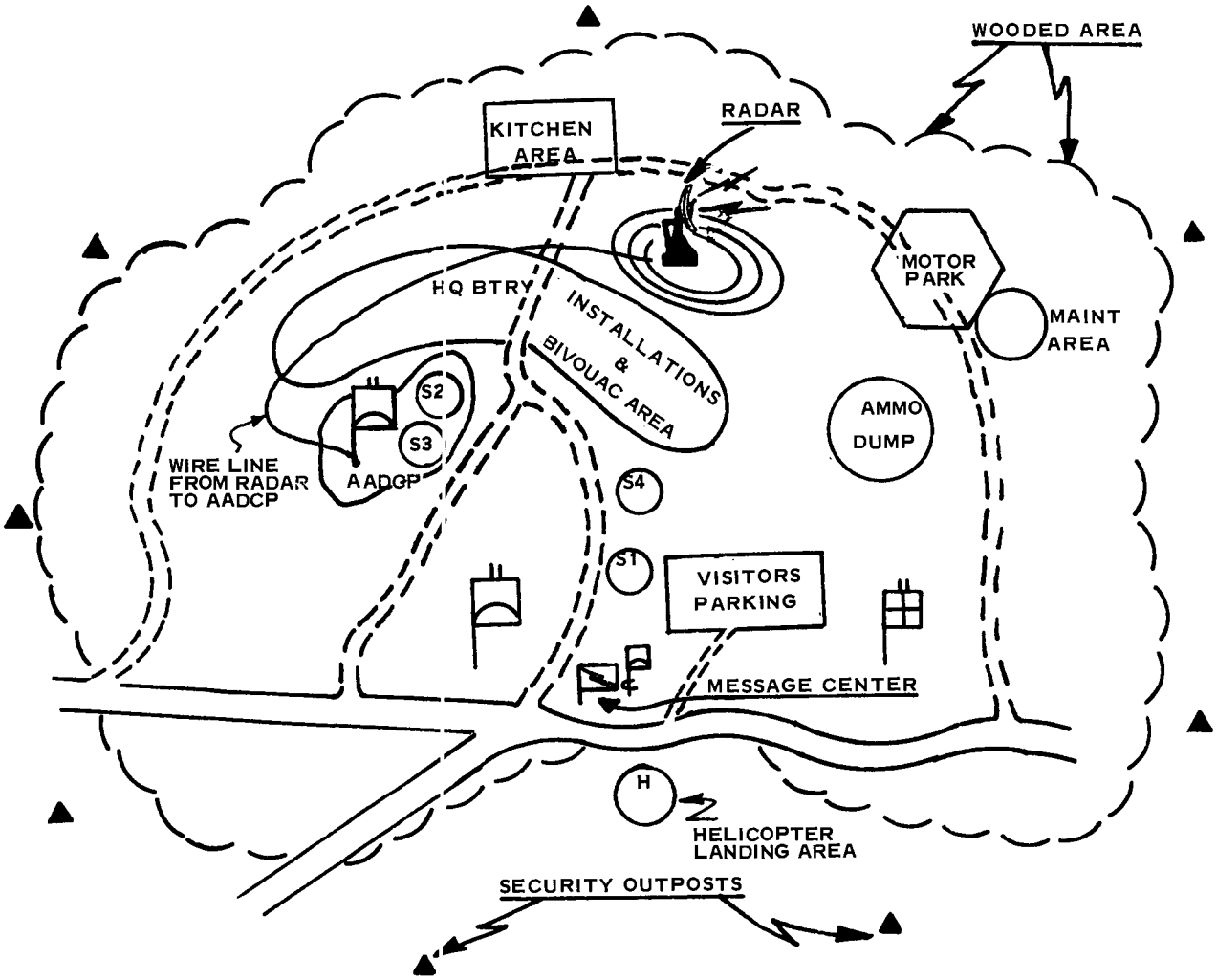

Figure 30. Typical headquarters and headquarters battery position.

and/or ground reconnaissance by the S2. Primary sector of search not greater than 3,200 mils normally should be assigned observers, however, positions which provide a 6,400 mil search capability should be selected if possible. The smaller the search sector the better the probability of detecting target within that sector, however, consideration of all-round coverage cannot be neglected.

d. Cover and Concealment. The headquarters area should have sufficient defilade to minimize visual or radar observations by the enemy. In heavily wooded areas concealment is available, but it is difficult to find good locations for the radar, radios, panel stations and helicopter pads. In areas of sparse or scattered vegetation, it is necessary to include plans for camouflage. In open terrain, such as desert, elements in the CP area should be dispersed in such a manner as to complicate the installation identity.

e. Local Security. The position selected should facilitate organization of local security with the weapons and personnel available. The headquarters and headquarters battery area should, if possible, be located to derive some protection from the automatic weapon batteries. The headquarters battery commander should develop local security plans and integrate the defense with adjacent units for mutual protection. The perimeter defense includes

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prepared positions for machineguns, rocket launchers, sentinels, outposts, alarm devices, and obstacles, all located to provide a flexible, all-round defense of the position area. For a detailed discussion of the defense of the headquarters and headquarters battery area, see chapter 6.

f. Headquarters Battery Area. The location of the battalion headquarters, the tactical situation, security, supply, sanitation, and accessibility are considerations in locating of the headquarters battery area. Drainage, concealment, and protection from the enemy are important considerations. The area should offer adequate space for the motor park and maintenance facilities. The elements of the battery should be grouped logically for ease of operations; however, protection of the battalion headquarters must also be considered.

60. Planning the Occupation

a. General. After selecting locations for the various elements of the headquarters and verifying the plan for the headquarters battery area, the headquarters battery commander plans for occupation.

b. Equipment. It may be desirable to move and install a certain amount of equipment prior to the occupation. Generally, such equipment will be communication equipment and facilities for shelter. For example, the operations central should be able to move into the area, occupy position, and begin operations without delay.

c. Road Guides. When the headquarters and headquarters battery moves as part of the same march unit as the firing batteries, road guides are usually provided for in the orders of the battalion commander. When the headquarters elements displace alone, the headquarters battery commander is responsible for providing road guides.

61. Coordination

Because all headquarters staff elements are affected by displacement of the headquarters battery, the headquarters battery commander should coordinate general plans for movement to and occupation of the new area with the battalion executive officer.

62. Supervision of the Movement to, and Occupation of, Position

The headquarters battery commander may return from the reconnaissance, assemble certain personnel from the staff sections and headquarters battery, and proceed to the new area in advance of the main column. This party should carry road signs and sufficient personnel to act as guides and to prepare the new area for occupation. In the absence of the headquarters battery commander or executive officer, a staff officer may be designated by the battalion commander or executive officer to lead the headquarters battery main column, or the battery commander may assign this duty to the first sergeant.

63. Displacement

a. The headquarters battery commander should at all times know the capabilities of his battery to move. If for any reason he is unable to move in one echelon, he should inform the battalion executive and recommend a method of displacement. When a move is imminent, he should be prepared to make recommendations before the battalion commander's plans are made. Therefore, he must be kept informed of all contemplated displacements. Detailed loading plans expedite the planning and displacement.

b. When the CP displaces by echelon, each staff officer is responsible for the section under his control. He informs the headquarters battery commander as to the number of personnel, the amount of equipment, and the persons in charge of the subdivisions in each echelon.

c. The headquarters battery standing operating procedure (loading plans) should provide for movement of the battery by separate echelons as well as by single march column. Specific personnel and equipment should be assigned to each echelon. This method will minimize the detailed instructions required each time a displacement is made.

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Section IV. AUTOMATIC WEAPON BATTERY

64. Introduction

In this section the reconnaissance, selection and occupation of ADA automatic weapon batteries are discussed with the M42 batteries in mind. The principles and sequence of events apply also to the M55 battery. The M55 battery normally will be attached to some larger unit and will conduct RSOP based upon the guidance of that commander. It is not expected that the M55 battery will often conduct RSOP as a battery but rather the sections will conduct the RSOP in conjunction with the displacement of the unit to which the section is attached. During the RSOP, the duties of automatic weapons personnel are generally the same regardless of the headquarters directing the displacement. The primary differences in duties are in the latitude that the battery commander has in selecting individual ADA AW sites in a battery as opposed to a battalion defense and the time available to conduct the RSOP will influence the requirement to decentralize duties of the reconnaissance party members.

65. Characteristics of Firing Battery Position

a. The position areas for automatic weapon batteries will be determined by the configuration of the defended unit or installation and by the weapons characteristics. The automatic weapon squads usually will be positioned to provide all-round defense of the defended unit or installation. The battery headquarters, maintenance, and mess facilities normally will be located within the defense provided by the automatic weapon squad and the battery headquarters often may be collocated with the headquarters of the defended unit or installation. In a battery defense the platoon command posts are not collocated normally with the battery command post unless such an arrangement facilitates messing and maintenance without degrading communication and supervision capabilities.

b. The automatic weapon battery position includes the ADA AW squad position, the platoon command post, the battery command post, a motor park, an ammunition dump, the mess, a switchboard, and radio vehicle locations.

66. Receipt of Orders

If the automatic weapon battery is to displace on order of the battalion commander, the order is received as outlined in paragraph 51. If the battery is operating independently the order for displacement will be received from the supported unit commander. The order will be essentially the same except that detail regarding individual air defense automatic weapon position will not be provided by the supported unit commander. The battery commander will develop the defense design and specific displacement detail of the order.

67. Reconnaissance of the Battery Position Area

When the battery commander arrives at the new battery position area with his party, he first determines the location and boundaries of the unit or installation he is to defend. He then inspects the surrounding terrain to determine avenues of approach and possible automatic weapon location; then he begins his ground reconnaissance to select the location of each weapon, the location of ground aircraft observers when this function is delegated by the battalion commander and other battery installations. In a rapid reconnaissance of position, decentralization of duties is essential. Reconnaissance party personnel must be capable of performing duties with little or no supervision. Platoon leaders, section chief or squad representatives select individual weapon locations based on guidance and general areas assigned by the battery commander. Continuous practice of standing operating procedures will greatly simplify and hasten the reconnaissance of position. Whenever possible the battery commander should personally select the location of the weapon squads and these positions normally are selected before any other part of the reconnaissance is performed. During the ground reconnaissance the battery commander should, time permitting, also determine—

a. The map coordinates of each primary and alternate automatic weapon position so that defense analysis can begin immediately and

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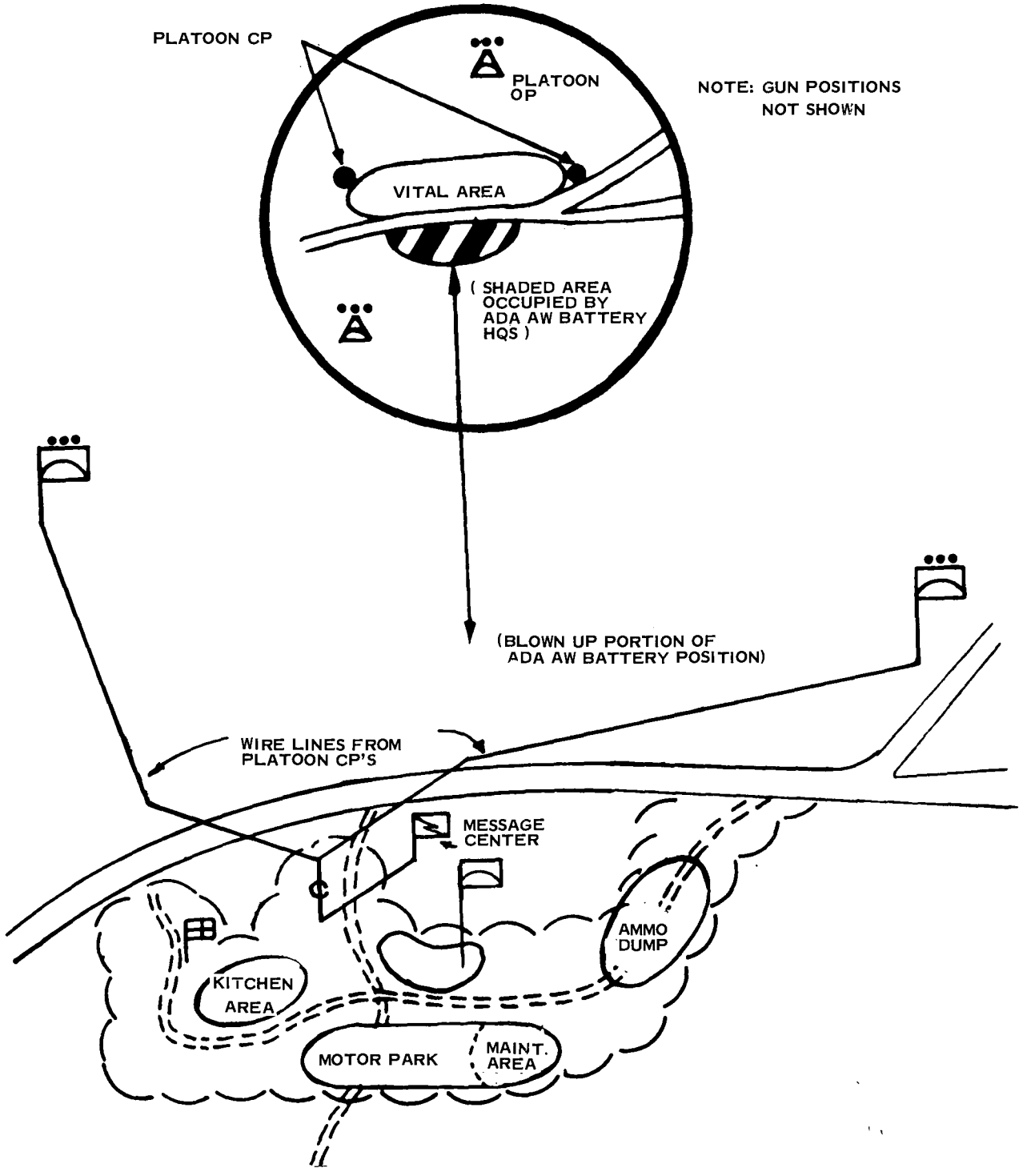

Figure 31. Typical ADA automatic weapons battery position.

necessary adjustments in weapon location can be accomplished quickly. (If positions are selected by platoon leaders they immediately report automatic weapon map locations and sector of fire, so that defense analysis can be made and adjustments directed if required.)

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b. The positions of local security weapons to include, if possible, supplementary positions of automatic weapons squad to exploit their firepower against ground targets.

c. The entrance and exit routes to battery headquarters area.

d. The established primary and secondary sectors of fire.

e. The location of command post, motor parks, ammunition dump, radio sets, and switchboard.

68. Selection of Position

a. Sectors of Fire and Observation.

(1) ADA AW squad positions should be selected which offer a maximum of unobstructed fields of fire and observation. Positions on the geographical crest of high terrain normally will meet this requirement. However, commanders must consider the increased detectability of weapons so positioned. Individual weapons may not always have 6400‰ (360°) fields of fire but the entire defense should provide all-round coverage of the defended area.

(2) Since target detection and identification, and engagement depends upon visual means, the selected sites should provide for maximum sectors of observation. Personnel employed as ground aircraft observers should be positioned to provide warning in time for weapon crews to prepare for engagement.

b. Mutual Support. Adjacent M42 squads should be sited within 1,100 meters of each other. M55 squads are positioned not more than 500 meters apart. These distances provide for mutual support between adjacent weapons.

c. Level Ground. The ground for emplacing automatic weapons should be as level as possible to reduce the overload on traversing mechanism and to optimize operation of the sighting device. If necessary, selected location should be leveled prior to occupation of the position if time permits.

d. Command Post (Battery and Platoon). The command post should be located to facilitate supervision of the automatic weapons and coordination with the defended unit. Position which assists line of site radio communication is also a factor but since radio can be remoted to the command post, defilade and concealment for the command post should be standard.

e. Local Security. All-round ground defense of the battery headquarters position should be provided. This is normally possible by establishing outpost machinegun positions, rocket launcher positions and obstacles. When ADA AW squads are sited nearby, supplementary positions may be selected to enhance the defense of the headquarters area. For a discussion of local security, see chapter 6.

f. Mess. The mess should be placed in a defiladed and concealed location. The area should have good drainage and soil conditions that will permit absorption of seepage from dumps and garbage pits.

g. Motor Park. The motor park should be located in an area that is readily accessible and has firm ground, good drainage, concealment and sufficient space for dispersion of vehicles. When cover is not available, vehicles should be dispersed with a minimum distance of 50 meters between vehicles. A maintenance area should be established in the motor park.

h. Ammunition Dump. The ammunition dump should be located in concealed defilade position. The area should be readily accessible to ammunition resupply vehicles and its location known to battery personnel.

69. Planning and Preparing for the Occupation

The battery commander formulates his plan for the occupation as he performs his reconnaissance of the battery position. After the reconnaissance and selection of position, he issues orders for the occupation to the reconnaissance party, and preparation for occupation begins.

a. General Instructions. The battery commander points out the location of each ADA AW squad; identifies the primary and secondary

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sectors of fire. He gives instructions concerning routes into and out of the battery area, camouflage, and the positions for local security weapons, including supplementary positions of primary weapons.

b. Communication Instructions. The battery commander points out the locations of the battery command post and gives the necessary orders for the installation of the battery communication system. When necessary, he gives the communication chief detailed instructions concerning wire lines that must be laid outside the battery area and concerning radio nets establishment that deviate from standing operating procedures.

c. Actions Prior to Arrival of Battery. After receiving the battery commander's instructions, the reconnaissance party rapidly prepares for the arrival of the battery. Automatic weapon marking stakes are emplaced for each automatic weapon position and to mark primary and secondary sectors of fire. Automatic weapon positions are leveled, if required. Wire nets are installed, and guides are designated to direct each vehicle to its proper location.

70. Displacing the Battery

a. When the battery moves as a part of the battalion, march column control usually is exercised by the battalion executive officer, who will announce the start point (SP), order of march, rate of march, distance between vehicles and units, and the release point (RP). The battery executive usually commands the battery march unit. Security measures to be taken on the march and upon arrival at the new position should be prescribed in the battery SOP.

b. At times, the battery commander may control the displacement; when he does, the essential elements for column control, described above, either must be a matter of SOP or must be announced.

c. The formation of the battery column should remain the same regardless of the headquarters controlling the movement. Automatic weapons should be dispersed in the column to provide air defense and ground security. The convoy should be organized so that mission essential elements reach the area first. Radio vehicles should be located as a minimum at the front and rear of the column to provide control.

d. The battery may also displace by single squad (infiltration) or by platoon (echelon). The following conditions usually will dictate squad or platoon displacement.

(1) The defended unit or installation requires continuous air defense coverage.

(2) The road is crowded and load clearances cannot be obtained for the entire battery.

(3) The road is under artillery attack.

71. Occupation of Position

a. General.

(1) The actual occupation of position must be thoroughly planned to prevent confusion and to save time. The battery and defended installation are extremely vulnerable during the occupation because of limited observation and nonoptimum location of automatic weapon squads. Therefore, this critical phase must be completed as quickly and efficiently as possible.

(2) When the battery arrives at the position, all vehicles should be moved off the road into the position area without halting or without closing the interval between vehicles. Guides should lead each vehicle to its proper location. As soon as vehicles are unloaded, they should be guided to the motor park or other designated point. Equipment should be unloaded quietly, quickly, and in an orderly manner. Noise should be held to a minimum so that commands and other necessary instructions may be heard. Previous training should insure that a minimum of orders and instructions will be necessary for occupation.

b. Night Occupation.

(1) Practice in night occupation of posi-

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tion is necessary to insure smooth operation. When time and the situation permit, daylight reconnaissance should be made by all key personnel. This may be accomplished by shifts to reduce the size of the party. The number and location of road guides required should be determined, and plans for local security on the march and in the new position should be made. Night occupation of position is facilitated when adequate guides are made available. Guides should know the location of each installation in the area. In making a reconnaissance prior to a night occupation, marking stakes are used to identify ADA AW squad position. An identifying tag or tape with lettering that can be read under blackout conditions is attached to each position stake. Night occupation may also be facilitated by accomplishing certain other tasks during daylight. Some of these tasks are—

(*a*) Leveling the automatic weapon site.
(*b*) Laying wire.
(*c*) Digging automatic weapon parapets and foxholes.
(*d*) Preparing the command post.
(*e*) Installing night lighting devices on sector of fire stakes.
(*f*) Marking with white tape routes within the position.

(2) A night occupation requires more time than a daylight occupation; in addition, there is an even greater need for order and efficiency in a night occupation. No attempt should be made to hasten the operation until all personnel are capable of performing their duties in darkness. Particular care is necessary in guiding vehicles during blackout. Immediate corrective action must be taken to overcome violations of light and sound discipline.

Section V. RSOP IN THE GROUND ROLE

72. General

When the ground threat exceeds the air threat or as the force commander elects, ADA AW units may be used in a ground role. The methods outlined in this section apply to all types of ground support employment, whether in support of infantry units in the offense or defense, in guerrilla or counterinsurgency operations, or in airborne and airmobile operations. The primary consideration is to select weapon positions which will permit optimum utilization of firepower in support of ground operations. When ADA AW units are assigned the ground support role, they usually are attached to the units they will support. The ADA commander will act as an advisor to the supported commander and reconnoiter and occupy positions in accordance with the guidance of the supported unit commander.

73. Reconnaissance

The ADA commander should be briefed by the supported unit commander as to the general plan of operations, the fire support required, location of friendly units, location of known and probable enemy targets and coordinates of desired squad positions. A map reconnaissance will be conducted, followed by a ground reconnaissance, to determine the following:

a. Primary and alternate firing positions for each weapon.

b. Routes to primary and alternate positions.

c. Likely avenues of approach of hostile forces.

d. Locations of friendly elements.

74. Selection of Position

The selected weapon positions for the ground mission must provide for complete integration with the supported unit's Fire Support Plan. Positions selected should enable each squad to—

a. Site weapons within mutual supporting distance of adjacent air defense automatic weapons and/or weapons of the supported unit.

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b. Utilize maximum effective direct fire and indirect fire range capability of the weapon against ground targets.

c. Assist in providing a base of direct fire for the supported unit.

d. Assist in the protection of key terrain features.

e. Provide essential observation.

f. Deny the enemy close observation into the defended area.

g. Locate positions so as not to interfere with fields of fire of other weapons.

h. Take maximum advantage of natural cover and concealment.

75. Occupation

The occupation of position should be coordinated with the support units to avoid interference with the movement of other units and to insure that ADA AW movements do not draw fire into the supported unit area. Moves should be conducted so that maximum cover and concealment is utilized. When the situation permits night occupation of positions should be utilized.

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CHAPTER 6

SURVIVABILITY OF ADA AW UNITS

Section I. LOCAL SECURITY

76. Introduction

a. In order to survive on the battlefield, ADA AW units must protect themselves against ground or air attack, espionage, observation, sabotage, harassment, and surprise. All reasonable measures which do not degrade system effectiveness or interfere with the accomplishment of the assigned mission should be employed to enhance survivability.

b. Measures taken to enhance the survivability of a unit are placed in one of two general categories: local security and supplementary measures.

(1) LOCAL SECURITY MEASURES, as used in this section, include measures taken by ADA AW elements and their supported or defended unit, to enhance the survivability of ADA AW elements. These measures, active and passive, include the use of weapons, operating procedures, improvement of positions, camouflage and integration with security plans of adjacent or supported units.

(2) SUPPLEMENTARY MEASURES (para 94–96) include those survivability measures which require support of, or coordination with, higher echelons and integration into the overall concept of ground operations. Examples are movement to avoid targeting and construction of dummy positions.

c. Relationship of mission to survivability is as follows:

(1) *Local security procedures.*

(*a*) *Air defense mission.* When the defended unit or installation is subjected to ground attack, ADA AW units may be required to subordinate the air defense mission temporarily in order to defend against a ground attack. In accordance with the ADA AW commander's local security plan, the ground defense should be developed around the ADA AW. This may require moving the weapons to more suitable firing positions, or expansion of the defense perimeter to include these weapons. If the defended unit or installation is incapable of providing adequate local security forces, additional responsibility for local security will devolve upon the local air defense commander. This applies particularly to such installations as bridges and supply depots. The local security plan may require the primary weapons withdrawing to supplementary firing positions within the security perimeter during hours of darkness. The air defense role is resumed just prior to daylight.

(*b*) *Ground support mission.* ADA AW units assigned this mission normally will position weapons on or within the perimeter of the unit to which attached so as to accomplish the assigned mission. Their sectors of fire will be integrated with the supported unit's fire plan in such a manner as best to support combat operations of the unit to which at-

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tached. If ADA AW units must be employed to provide surface-to-surface artillery fire, it may be necessary to position the weapons some distance from the supported unit. The weapons should, however, withdraw within the supported unit's perimeter during hours of darkness or at the termination of the mission. Security functions such as conduct of patrols and manning of security outposts should be performed by the supported unit as a duty associated with conduct of combat operations and this responsibility should not fall to the ADA AW commander.

(2) *Supplementary measures* (para 94–96). Supplementary measures, as contrasted with local security measures, are "additional" measures taken to enhance the survivability of an ADA AW unit. Since they are supplementary or "extra" measures, they are implemented in such a manner as to minimize their effect on the accomplishment of the ADA mission.

77. Basic Considerations

a. Responsibility for Unit Security. The responsibility for security may vary with the mission assigned to the ADA AW unit.

(1) *ADA AW in ground support role.* ADA AW units, when employed in this role, normally will be attached to a ground force. Ground defensive actions taken by ADA AW units are integrated with those of the unit to which attached. In this role, the force commander assumes overall responsibility for the establishment of local security measures. The air defense unit commander must coordinate with the force commander to determine the specific functions to be accomplished by ADA AW elements. The major air defense contribution to local security will be the firepower provided by the primary ADA weapon. Primary ADA weapons (M42 or M55) can deliver a high volume of accurate, effective, direct fire against ground targets. When ADA AW elements form an integral part of the local security of a unit, the force commander may wish to specify individual weapon locations.

(2) *ADA AW units in air defense role.*

(*a*) In this role, the air defense mission is paramount. The appropriate air defense unit commander (e.g., battalion commander, battery commander, platoon leader, squad leader) is responsible for the security and protection of his unit. The air defense mission requires early engagement of hostile aircraft. Thus, situations may arise where weapon positions are located beyond the ground defensive perimeter of a defended area and subject to being isolated and attacked by enemy ground forces. When under attack, the weapon squad must defend itself until assistance arrives, or the squad must withdraw within the defensive perimeter.

(*b*) The defended unit or installation commander is responsible for the local security of the unit or installation. Local security measures of ADA AW element should be integrated with those of the defended unit or installation to the extent possible without degrading the air defense capability. Any integration of local security measures is based upon *mutual agreement* between the appropriate air defense commander and defended unit or installation commander.

b. Local Security Procedures. Although the responsibility for local security may vary with the mission of the air defense unit, the following steps should be taken by responsible commanders to insure effective local security:

(1) *Preparation of the unit security plan.* On the basis of the responsible com-

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mander's selection of locations for weapons and headquarters elements and his plan for defense, the security officer (normally the executive officer) prepares a detailed plan for the local defense. He specifies the responsibilities of personnel at each machinegun, rocket launcher, or other crew-served weapon position and supervises the posting of security outposts, machineguns, and rocket launchers. He indicates positions for observation and listening posts, giving particular attention to surveillance of approaches during conditions of limited visibility or darkness.

(2) Coordinating the installation, marking, charting, reporting, and removal of warning devices, barbed wire, mines, and boobytraps. All such obstacles should be covered by the fire of crew-served automatic weapons or individual small arms.

(3) Coordinating ground defense plans with adjacent units.

(4) Assigning specific ground defense missions to elements of the defense.

(5) Planning, organizing, and dispatching patrols as required.

(6) Organizing the reserve force.

(7) Supervising the continuous improvement of the ground defense.

(8) Preparing and submitting a plan for the overall defense to the commander for approval. In a battalion defense, battery plans will be submitted to the battalion executive officer for approval and coordination.

(9) Conducting rehearsals of the ground defense plan.

(10) Assigning primary and secondary sectors of fire to each crew-served weapons.

(11) Assigning definite defensive positions to all personnel to insure all-round defense.

(12) Developing fire plans to cover all likely avenues of approach and to integrate the fires of all weapons.

(13) Developing an effective early warning system.

(14) Developing and coordinating procedures for requesting reinforcement.

(15) Selecting alternate and supplementary firing positions.

(16) Digging in or revetting all positions.

(17) Selecting routes for withdrawal of isolated weapon squads.

c. Actions to be Performed. The following paragraphs discuss actions which may be taken by ADA AW units to enhance their defense posture. These measures must be selectively applied at all levels to insure that personnel resources are effectively utilized. ADA AW squads should not provide personnel for outposts and patrols if this will degrade their ability to accomplish the primary mission.

78. Standing Operating Procedures

The preparation of a unit security SOP is the first step in the establishment of effective security measures. Automatic weapon battery SOP's should include procedures to be followed by platoons and sections when these subordinate units are operating independently of the battery. The SOP must be sufficiently flexible to apply in varying situations. Frequent drills must be conducted to insure preparedness and to orient new personnel. Some of these drills should be conducted under conditions of limited visibility. Planning and verbal dissemination of security measures must be initiated at the time a new position is selected. Refinements and adjustments to security measures will be made as time and availability of personnel permit. This applies particularly to the integration of the unit ground defense plan with that of defended, adjacent or supported units. The SOP should discuss the following:

a. Duties of personnel by TOE position.

b. Effective cover and concealment measures (to be initiated immediately after emplacement of the primary weapon).

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c. Employment of mines, obstacles, and alerting devices.

d. Communications and warning procedures.

e. Primary and secondary sectors of fire, safety zones, and range stakes for crew-served weapons.

f. Protection of crew-served weapons by rifle fire.

g. Reserve force and external assistance.

h. Responsibility for ammunition supply.

i. Standard procedures for patrols and security outposts.

j. Emergency destruction procedures.

k. Example diagrams of unit area, perimeter, fields of fire, obstacles.

79. Reserve Force

Battery and battalion headquarters units will make provisions for a reserve force. This force may be used to defend the headquarters, surveillance radar, and necessary administrative facilities. If the battalion or battery is deployed in a single defense, the reserve force may be used to reinforce any portion of the defense, as required. Defenses composed of platoons and sections may require this force from the supported, defended or adjacent units. The primary purposes of the reserve force are to counterattack and destroy or eject any enemy who penetrates the perimeter and to restore the defensive line. This force should be organized and equipped insofar as practical to act as an infantry unit. The security officer (usually the executive officer) supervises the reserve force and insures that it receives complete instructions, including signal for, and place of, assembly.

80. Security Outposts

Security outposts provide timely warning of attack and deny the enemy unopposed close observation of occupied areas. Within their capabilities, security outposts seek to delay and disorganize the attacking force. Security outposts may include primary ADA AW or other crew-served weapon positions. They should be situated on commanding terrain which provides observation and coverage by fire over all routes of approach into the defended area. The distance from the defensive perimeter to the outposts depends on the terrain in and around the position area. However, the security outposts should be placed far enough from the defensive perimeter to permit the warning of attack to be given in time for implementation of the defense plan. If necessary, the more distant outposts may be withdrawn into or near the defensive perimeter at night. When time permits, the intervals between security outposts are covered with barbed wire, obstacles, trip flares, and mines. Outpost personnel must be thoroughly briefed on the location of friendly positions and advised of the movements of personnel, such as messengers, patrols, and wire crews. Communication between the security outposts and the command post is imperative.

81. Listening Posts

If security outposts (including observation posts) are withdrawn at night to consolidate the perimeter defense, listening posts should be established outside the perimeter of the defended area to provide early warning to the unit. They are located along avenues of approach in order to detect the sounds made by enemy personnel and equipment, and they are positioned, to facilitate night observation of silhouettes. They should be dug in, provided with communications, and covered by fire from within the position.

82. Patrols

Avenues of approach to the defended area and areas which might provide concealment or cover for enemy forces should be actively patrolled or kept under surveillance. Patrols should cover specific areas but should not repeatedly follow identical routes or schedules. Patrols should make personal contact with as many of the outposts along their route as possible without exposing either themselves or the outposts. Visual contact must be made with those outposts in exposed locations. Patrols also maintain contact with adjacent units. When

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patrols locate enemy forces, they should not engage the enemy in a fire fight unless absolutely necessary, but should keep them under surveillance and notify the battery. During hours of darkness, and immediately after dawn, patrolling should be intensified. Patrol activities are coordinated with adjacent units to prevent duplication of effort and to minimize the possibility of friendly patrols firing on one another. ADA AW platoons have insufficient personnel to conduct patrols. Normally they will be conducted by personnel from headquarters elements or by the defended unit.

83. Communications

Communications between the ADA weapons, outposts, patrols, and the ADA and supported units CP's must be established. Radio is primary but wire circuits should connect all outposts with the battery CP and the weapon squads (para 100*b*). One effective solution is to place them all on one continuous circuit (hot loop). This permits one outpost to alert all the other outposts and weapon squads simultaneously. Alternate methods, such as sound devices, pyrotechnics, and runners should be ready for use, if necessary. When time permits wire lines should be buried and alternate lines provided to all positions. Radio communication normally will be used by patrols and may also supplement the wire communication to the outposts.

84. Obstacles

Obstaces may be used to reinforce the outpost system and the main perimeter defense. Artificial obstacles may be used to supplement natural obstacles. Both must be covered by fire to be effective. Devices, such as mines, flame field expedients, trip flares, and barbed wire, serve both as obstacles and as part of the warning system. Mines and boobytraps may be used when specifically authorized by higher headquarters. Unit minefields must be properly marked, recorded, and reported, and friendly personnel must be warned of their location. The report must be submitted to higher headquarters and to friendly units in the vicinity and must show the locations of the mines and safety lanes (FM 31–10). Guards may be posted to warn friendly personnel. Concertina and double-apron barbed wire is used to cover avenues of approach and to protect the main perimeter defense. Barbed wire should be located beyond the normal grenade throwing distance from protected installations, yet close enough to insure both day and night observation and fire coverage.

85. Illumination

Illuminating devices may be used effectively during night attacks. Plans for illumination, location of trip flares, and plans for additional assistance usually must be planned and coordinated with higher headquarters. Care must be taken to avoid unnecessary illumination of defensive positions while insuring maximum illumination of attacking forces.

86. Early Warning

a. An effective early warning system reduces the chances of surprise attack, either by aircraft or enemy ground forces. A combination of methods employing observers, pyrotechnics, trip flares, noise-making devices, and communications for early warning, can be used to alert the unit to impending attack.

b. In order to provide a standard method of disseminating emergency warnings within the NATO Forces operating on land, the United States Armed Forces, together with certain other NATO Armed Forces, have concurred in the provisions of STANAG No. 2047—Emergency Warnings of Hazard or Attack. Details of STANAG No. 2047 are contained in appendix II.

87. Perimeter Sketch

When batteries are operating as part of a battalion defense, the battery commander forwards an accurate sketch of the battery defenses to the battalion executive officer. This sketch is consolidated with those of the other batteries into one overall plan of the battalion defenses. The information to be included on the sketch will be designated in the battalion

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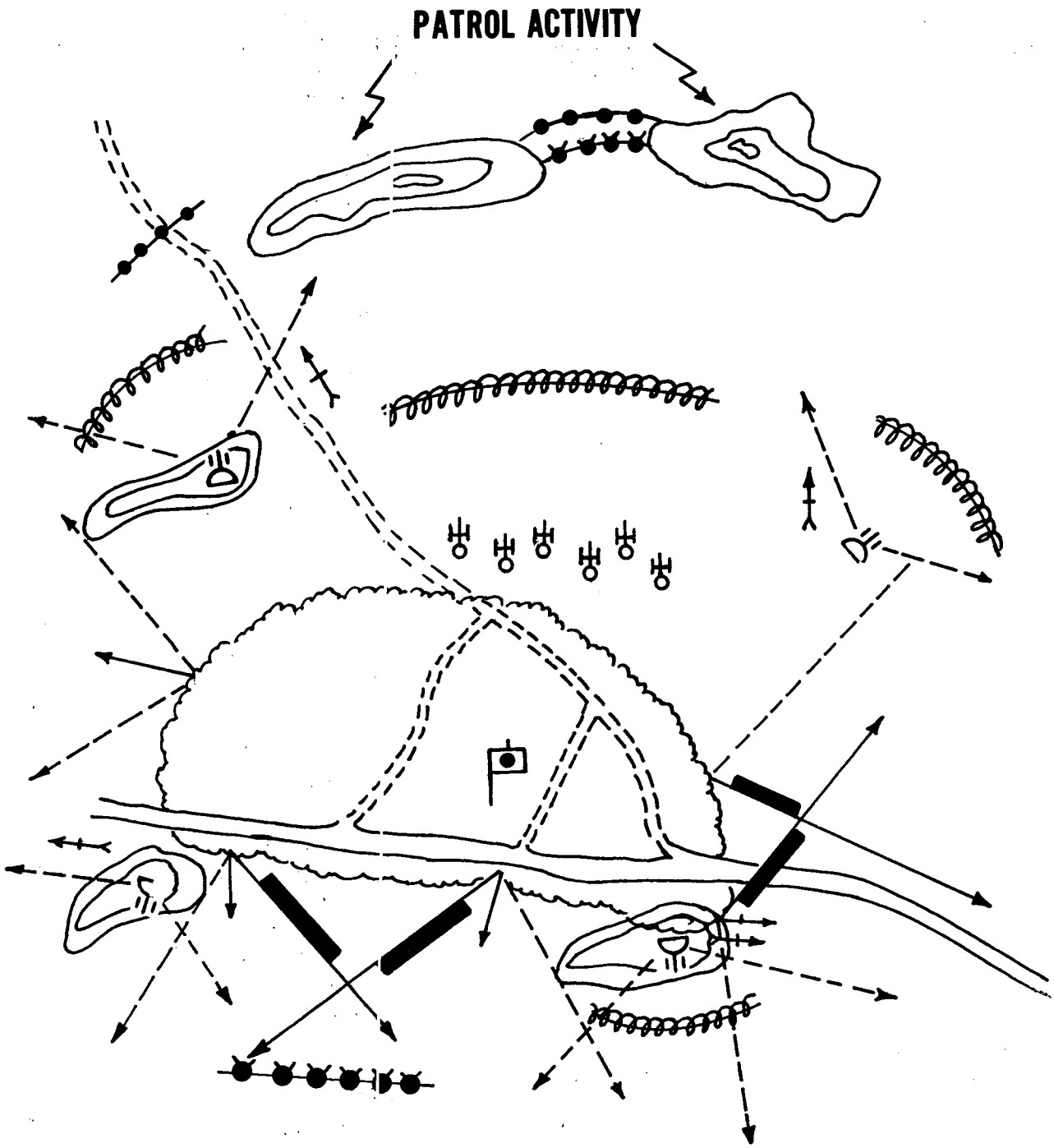

Figure 32. Perimeter sketch of ADA AW local security.

SOP. Batteries operating independently of the battalion will also submit sketches to the battalion executive officer for approval. Batteries, platoons, and sections attached to other units will submit perimeter sketches with their security plan to the security officer of the supported unit for coordination and approval. In addition to weapon locations and fields of fire,

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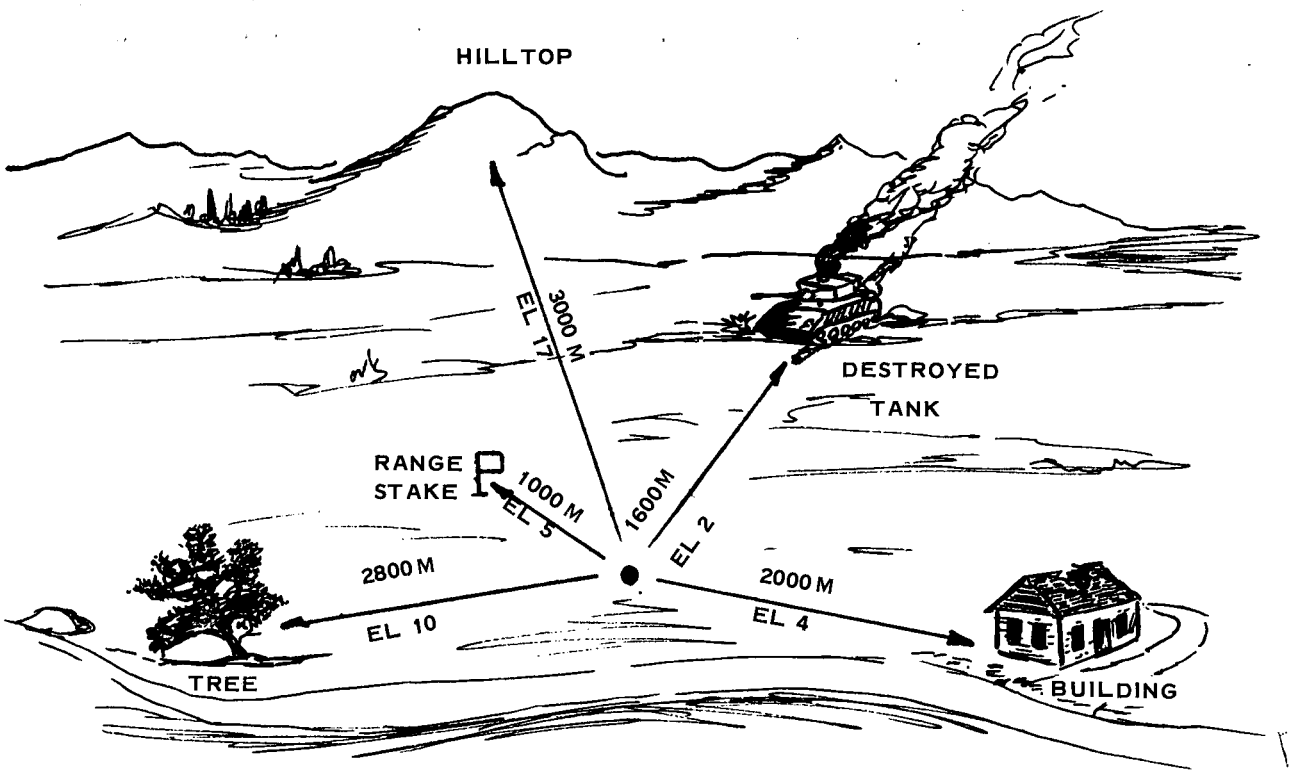

Figure 33. Range card for direct fire.

the sketch should show locations of command posts, security outposts, obstacles, and installations which may be sought by messengers or communication personnel. See figure 32.

88. Range Cards

After sectors of fire have been assigned to each weapon, the squad leader prepares a range card for his sector (fig. 33). These cards indicate the ranges to critical points on all likely avenues of approach, whether within or outside the assigned sector. As time permits, a quadrant elevation should be added to the range card for each recorded range. If there are no prominent terrain features in the sector, stakes may be driven into the ground for reference. As time permits, range cards are improved by replacing estimated data with more accurate data obtained by firing, pacing, taping, or map measurement. The range card must be readily available, and all men in the section should be familiar with its use.

89. Column Security

a. ADA AW Unit. When moving in convoy, M42 and M55 units are capable of effective self defense against ground and air attack. Primary weapons should be dispersed throughout the column and manned continuously. Sectors of fire should be assigned to each weapon to provide a balanced amount of firepower to each side, forward and rear of the column in the event of ground or air attack. Plans must be prepared and disseminated to insure that each vehicle driver knows what action to take when the column encounters enemy forces, roadblocks, or comes under air attack. In the event of air attack, ADA AW squads will disperse to either side of the road and begin engagement. During halts in the march, vehicles will be dispersed and a security perimeter established.

b. Supported/Defended Unit. When moving with a supported or defended unit, ADA auto-

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matic weapons should be included in the column security plan. When sufficient weapons are available, they should be dispersed throughout the column as *a* above. If sufficient weapons are not available, they should be positioned near front and rear of the column and be prepared to deploy as directed by the column commander.

90. CBR Defense

a. General. The continued effectiveness of ADA AW units during CBR attack is dependent upon the degree of training and availability of proper equipment. It is imperative that all personnel be thoroughly trained in all aspects of CBR operations. The nature of this type of warfare may cause untrained soldiers to panic at the first sign of CBR attack and cause units to become ineffective. Headquarters units must designate teams for detection and decontamination when employed in battalion and battery defenses. ADA AW platoons and sections attached to other units must be provided this capability by the supported unit.

b. Chemical. Chemical agents may take the form of vapors, aerosols, or liquids. They may be delivered by artillery projectiles and missiles, bomblets, or by spraying. Many agents will possess no odor or color and can be detected only by detection equipment or by resultant symptoms in personnel. The following procedures will reduce the vulnerability of personnel to the chemical agents:

(1) An effective warning system must be employed and understood by all personnel.

(2) Once chemical operations are initiated or become imminent, mask any time your position is subjected to artillery attack, bombing, aircraft, spray, or enemy smoke.

(3) Wear protective clothing and apply protective ointment when alerted to the presence of chemical agents.

(4) When possible, avoid contaminated areas.

(5) Insure that protective and detection equipment can function properly.

(6) Personnel in bunkers and buildings should secure windows, doors and other openings when under chemical attack.

(7) Know and apply first aid measures immediately upon contamination.

c. Biological. Biological agents are microorganisms which cause disease in personnel, plants, or animals, or cause the deterioration of materiel. The presence of these agents can be confirmed only by laboratory examination and hence, significant numbers of personnel may become infected before the presence of agents is recognized. Furthermore, biological agents do not produce immediate casualties. The incubation period may last hours, days or weeks. Biological agents may contaminate food and water supplies and, in some cases, clothing and equipment, or may be spread by insects such as mosquitoes, flies, and ticks. The following measures will reduce the vulnerability of personnel to biological agents:

(1) Use masks and protective clothing when biological attack is suspected. Normal field uniform, properly worn, will generally provide an effective covering against biological agents.

(2) Breaks in the skin must be cleaned and kept covered.

(3) Take all prescribed immunizations or other medication.

(4) Keep food and water supplies protected.

(5) Avoid food and water which may be contaminated. This includes native foods and beverages, fruits, vegetables, and animals.

(6) Maintain high standards of personal cleanliness and sanitation.

(7) Notify medical personnel at the first indication of sickness.

d. Nuclear. The effects resulting from detonation of nuclear weapons are classified as blast, thermal, and radiological.

(1) *Blast.* The blast effect of a nuclear detonation is caused by the violent

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changes in air pressure that develop almost instantaneously after the explosion. The high winds and differences in air pressure may cause buildings to collapsed, vehicles to overturn, and flying debris to fill the air.

(2) *Heat.* The heat given off during a nuclear explosion is called thermal radiation. The extremely high temperatures which result may cause serious burns to exposed skin or flash blindness.

(3) *Nuclear radiation.* Nuclear detonations produce two types of radiation —initial and residual. Initial nuclear radiation lasts for only a minute after the detonation although it may have lethal effects. Residual nuclear radiation results from surface contamination or from contaminated particles in the atmosphere which gradually settle to earth. Either type of radiation may result in sickness or death. The following measures will be helpful in reducing casualties as the result of a nuclear detonation:

(*a*) Take cover immediately. Seek cover behind any obstacle or terrain feature which is immediately available but do not remain standing in order to find shelter. Personnel prone on the ground are better protected than those standing.

(*b*) Cover exposed skin on hands and face.

(*c*) Foxholes and other fortifications should be prepared immediately after occupation of a position and emplacement of weapons.

(*d*) Equipment and weapons should be dug in or revetted.

(*e*) An effective warning system must be established and personnel acquainted with its use.

(*f*) Avoid contaminated areas.

(*g*) Personnel should be thoroughly familiar with first aid and decontamination procedures.

(*h*) Avoid contact with materiel, food and water until such items have been checked for radiation and declared free of contamination.

(*i*) Do not panic.

e. References. Detailed information concerning CBR operations and training is contained in FMs 3–10, 3–12, 21–11, 21–40, 21–41, and 21–48.

91. Field Fortifications

Construction of field fortifications should be initiated as soon as possible without delaying the delivery of fire. Bulldozers, if available, should be used to expedite the preparation of fortifications and conserve manpower. Whenever possible, fortifications should provide hull defilade or protection of the prime mover. Auxiliary equipment such as generators, vehicles, and stored ammunition must also be dug in or revetted. As a guide, one man using a pick and shovel can excavate from one-half to 1 cubic meter of earth per hour. Sandbags and salvage material, such as powder containers and ammunition boxes filled with sand, provide suitable materiel for revetments. Commonality in size and configuration of M42 and M55 fortifications will serve to deceive the enemy as to the type weapons occupying positions. See FM 5–15 for further details on the various types of field fortifications.

92. Camouflage

Three fundamental considerations for effective use of camouflage are—choice of position, camouflage discipline, and camouflage construction. The purpose of camouflage is to conceal the location of the position or to mislead the enemy as to the strength, type, and intentions of the unit. In organizing his position area, the commander must prepare a camouflage plan to take advantage of natural concealment and to supplement the natural means by a skillful application of camouflage principles. Natural resources such as trees, brush, and grass generally provide the best camouflage. However, care must be exercised to replace such items as they deteriorate. Artificial camouflage consists of nets and paint. Both may be used to

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break up silhouettes, reduce glare, and blend equipment into the surrounding area. When using camouflage nets however, care must be exercised to insure that they do not interfere with operation of weapons. In the case of the surveillance radar, natural and artificial camouflage should not prevent rotation of the antenna or interfere with radar emissions. For a detailed discussion of camouflage, see FM 5–20 and FM 5–22.

93. Communication Security

Excessive and careless use of radio communications should be avoided. SOI's and other directives concerning the use of communications must be rigidly enforced. The location of units and plans for future operations can be determined if communications security is lacking. When time permits, wire should be installed and buried. Periodic checks should be performed to determine evidence of tampering or damage. Additional measures which contribute to effective communication security include—

a. Physical security of SOI's, SSI's, and codes.

b. Emergency destruction plans for classified material.

c. Remedial action to eliminate violations of communications security.

d. Training of communications personnel in security procedures.

e. Use of broadcast method of transmission whenever possible.

f. Planned change of radio frequencies.

g. Avoiding transmission of long or easily associated messages.

h. Alertness of operators to recognize irregularities in procedures.

Section II. SUPPLEMENTARY MEASURES

94. General

In addition to the specific security measures discussed above, the survivability of air defense units can be enhanced by use of the procedures discussed below. Supplementary measures have implications broader in scope than those which pertain solely to local security. These procedures will require approval of the force commanders and coordination with forces in whose areas the procedures are implemented.

95. Dummy Positions

Dummy positions may be employed to deceive the enemy as to the location and number of units. Location of dummy positions must be planned to properly support the overall concept of operations. The effectiveness of this technique can be improved by periodic interchange of dummy and actual units. Approval authority for the installation of dummy positions rests with the force commander. The air defense commander insures that construction of ADA AW dummy positions are integrated into the force deception plan and takes necessary steps to secure engineer support for construction of these positions. For a detailed discussion of dummy installations, see FM 5–23.

96. Movement to Avoid Targeting

Fixed ADA AW positions primarily in the forward combat area lend themselves to detection and observation by hostile forces. The longer these positions are occupied, the greater the probability that they will be subjected to artillery or air attack. In order to reduce this danger, weapons and command posts should be displaced at irregular intervals to alternate positions which have been prepared in advance. Movement to alternate positions may be appropriate after firing if it is suspected that weapon positions have been located by the enemy. These alternate positions should be so selected that when they are occupied, no measurable degradation will result in the overall defense.

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CHAPTER 7

COMMUNICATIONS

Section I. GENERAL

97. General

a. Radio and wire communications means are provided by the ADA AW units to facilitate command and control. Radio is the primary means of communication because it can best support the normal ADA AW unit operations involving frequent and rapid moves and widely dispersed position areas. Radio nets are supplemented and paralleled by wire nets as feasible. Use of messenger service and the practice of collocation of headquarters elements as an aid to communication are normal.

b. The commander bears overall responsibility for the provision of effective communications and for insuring continued unit operations should communications fail.

c. Unit communications personnel are responsible to the commander for—

(1) Advising him on matters pertaining to the employment of communications equipment.

(2) Informing him of additional communications requirements.

(3) The proper installation, operation, and maintenance of unit communications equipment.

98. Radiotelephone Procedure

a. All ADA AW unit personnel must be thoroughly familiar with proper radiotelephone procedure and comply strictly with instructions contained in Allied Communication Procedures (ACP) 125 and unit SSI and SOI.

b. Unnecessary and improper transmission must be avoided in order to prevent the enemy from obtaining information which will reveal the tactical disposition, strength, or movement of friendly forces. Effective transmission security requires constant supervision by the commanders and a high state of training on the part of personnel using communication nets. Communications security is discussed further in chapter 6, as a survivability measure.

Section II. ADA AW BATTALION, SELF-PROPELLED (M42)

99. Radio Net Requirements

a. General.

(1) The basic ADA AW battalion radio nets discussed in the following subparagraphs and depicted in figure 34 are sufficiently flexible to adapt to most situations. Sample specific applications are presented in paragraphs 105 through 108.

(2) The radio net system is augmented by wire and collocation of headquarters facilities within a unit headquarters when possible. This is normal within the battalion command post (Bn Cp) area.

b. Command Nets.

(1) The command FM radio nets link the various ADA AW unit commanders, as shown in figure 34. Battalion staff officers are included in the battalion command net. Each command net normally utilizes a different frequen-

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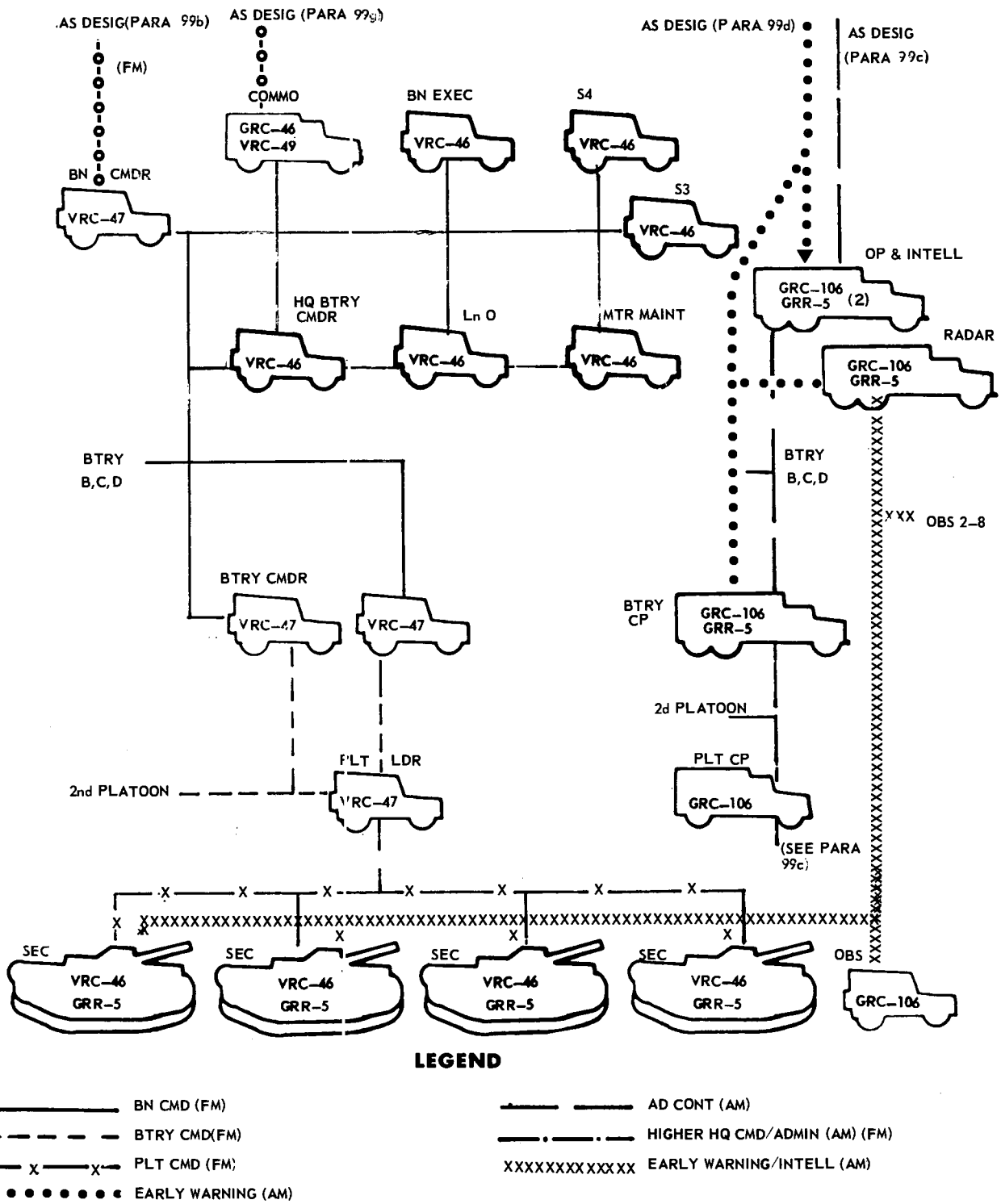

Figure 54. Radio nets, ADA AW battalion, M42.

cy; however, the command nets of a battery and its platoons may be combined if required by a shortage of available frequencies.

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(2) Command net (FM) radios provide single receiver transmitter capability, except as follows:

(*a*) The battalion commander is provided a dual receiver capability to allow operation in both the battalion command net and another designated net. The second net utilized may be a command/admin or other net operated by a division to which attached, a vital area air defense commander, or an airbase commander, depending on force organization.

(*b*) Each battery commander and battery command post is provided a dual receiver capability for operation in both the battalion and battery command nets. The ADA AW platoon leader is also provided a dual receiver capability for operation in the battery and platoon command nets.

(*c*) The battalion communications section utilizes a dual receiver-transmitter radio, in order to provide a relay capability for the battalion command net. Optionally, the second channel capability may be utilized in a higher headquarters FM net.

c. Air Defense Control Net. This long range AM net provides air defense commanders with a means to exercise their responsibility for control of ADA AW fires. See chapter 3 for a discussion of minimum information exchange involved in control of ADA AW fires. Aircraft location and identification information may also be carried over this net. This net connects the ADA AW battalion with a higher level air defense control agency such as an ADA group AADCP or a designated air defense/air traffic regulation facility. Arrangements must be made for provision of compatible radio equipment and operating personnel at the higher level AD control agency. This capability may be obtainable by special arrangement or by stationing one of the ADA AW ground aircraft observer teams at the control agency. The platoon extends the AD control net from platoon to the weapons squads by retransmitting through the platoon command net, or through use of wire.

d. Early Warning Net. This one-way AM net provides for receipt of broadcast warning information from higher echelons. The receivers are normally tuned to the division warning net when the ADA AW battalion is attached to a division, or to an AD warning channel when the battalion is deployed as part of a larger ADA force. Broadcast AD warning may emanate from an ADA group AADCP, a nearby Hawk unit, or an air defense/air traffic regulation facility.

e. Early Warning/Intelligence Net.

(1) This long range AM net provides the ground aircraft observers and the battalion radar section the capability to transmit warning and intelligence directly to each ADA AW squad. Battalion level control of the ground aircraft observer system is also accomplished through this net.

(2) The value of the information generated by the observer system may be increased by stationing an observer(s) with USAF tactical air control parties (TACP) and forward air control posts (FACP) in the forward division area.

(3) The type early warning/intelligence net depicted may be entered by up to 9 transmitters and monitored by 73 receivers. A high state of communications discipline is required.

f. Command and Administrative Net.

(1) *AM.* The long range radio teletype (RATT) net is used for exchange of command and administrative information with higher headquarters. This is normally the division headquarters when the ADA AW battalion is attached thereto, or an ADA group AADCP or vital area air defense commander when the battalion is deployed as part of a larger ADA force.

(2) *FM.* See *b*(2)(*a*) above.

g. Type Applications. See paragraphs 105

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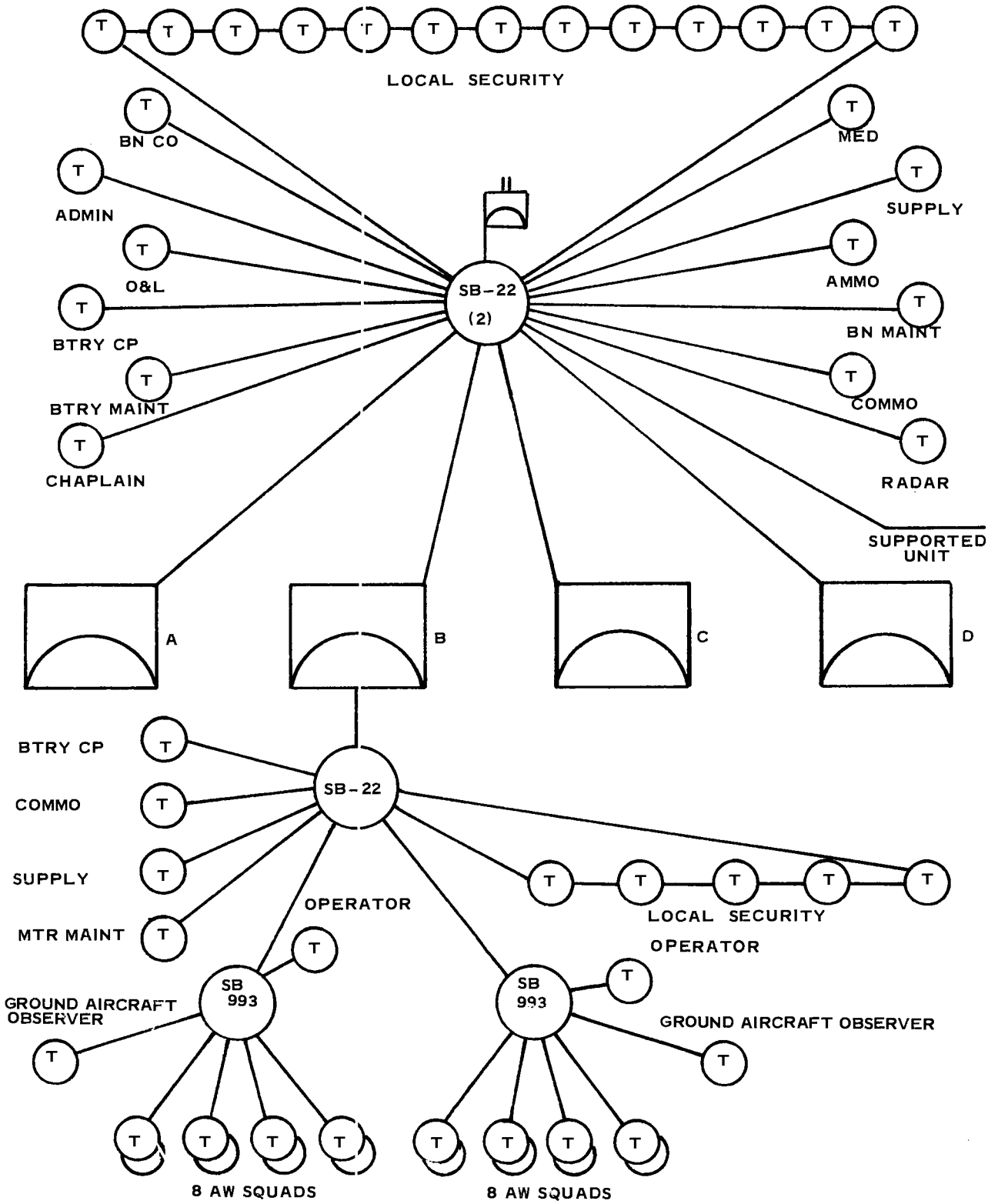

Figure 35. Wire nets, ADA AW battery (M42).

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through 108 for type radio net applications in a variety of force organizations.

100. Wire Net Requirements (fig. 35)

a. Wire nets are—

(1) Required to augment the radio nets in those cases where radios are not provided and collection is not feasible, as is the case *within* the various ADA AW unit headquarters. These lines receive first priority for laying.

(2) Desirable to parallel the radio nets in order to insure redundancy of communications.

b. A type wire system is depicted in figure 35. Headquarters battery installs lines from the battalion switchboards to each headquarters section and to the local ground security loop. The firing batteries lay lines from the battery switchboard to the headquarters battery switchboards; the battery command post; communications, supply, and motor maintenance sections; and the local security loop. The platoons lay lines from the platoon switchboard to the firing battery switchboard, the ADA AW squads, and the air observer. When practical, lines are laid to the supported unit.

c. See chapter 6 for a discussion of possible variations in the local security wire nets.

Section III. ADA MACHINEGUN BATTERY, CALIBER .50

101. General

M55 ADA AW battery elements normally are employed to provide local air defense to ground combat and combat support units. The communication means provided accommodate a variety of section and squad attachment variations. Dispersed fire unit employment under M55 ADA AW battery control requires additional communications.

102. Intelligence Communications (Radio) (fig. 36)

The M55 ADA AW battery headquarters maintains a receiver-only capability to monitor broadcast intelligence and warning information. The broadcast source varies with force organization as previously discussed in paragraph 99*d*. Rebroadcast to the ADA AW squads, if required, is via command communications, the defended or supported unit, or other specially provided radios.

103. Command Communications (Radio) (fig. 36)

a. The type "command" nets shown in figure 36 reflect a frequently used attachment scheme wherein the six ADA AW sections are attached to relatively low echelons of the defended or supported force with the battery headquarters operating at force headquarters level. Other variations are discussed in paragraphs 105 through 108.

b. The ADA AW squad radios are netted together and tied to the defended or supported unit. The squad radio utilized by the section leader is designated the net control station.

c. The battery radio ties in to the force headquarters, with provisions for operation in the ADA AW section nets when required and as radio range or the availability of additional communications permits.

d. When attached to other than an ADA AW unit (Hawk, Hercules, M42), additional communications should be obtained to preclude dependence on the unit to which attached for retransmission of control of fires (ch 3) information.

104. Wire Communications

Wire nets are extensively used within the M55 units to augment the available radio nets and to lessen the need for procurement of additional radio means. Frequent use of wire nets in the M55 battery is more practical than in the M42 battalion, due to the reduced movement requirements in normal M55 deployments. Wire nets are tailored for each deployment.

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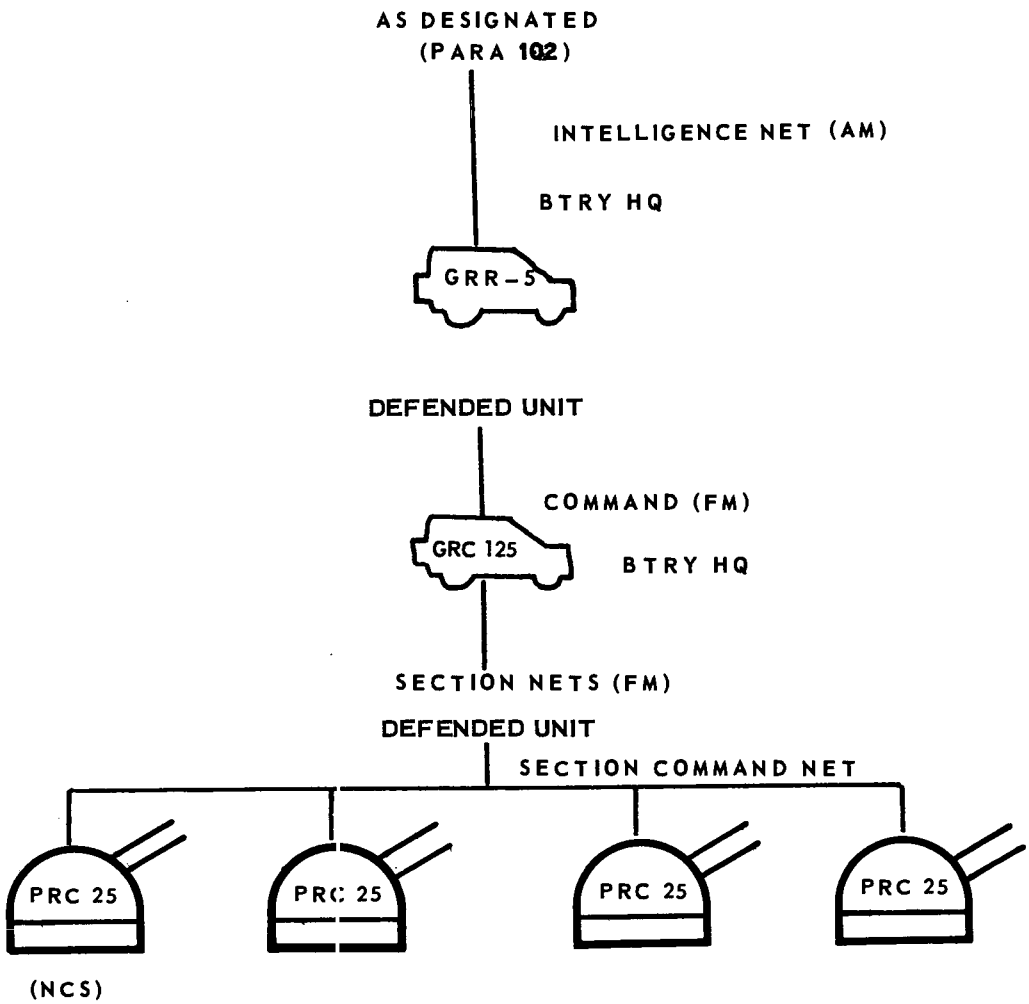

Figure 36. Radio nets, ADA machinegun battery (M55).

Section IV. TYPICAL RADIO NET APPLICATIONS

105. General

The radio net capability previously discussed is tailored for each situation. Several examples are presented in this section.

106. ADA AW Battalion (M42) in Division Air Defense

Figure 37 depicts typical radio netting in a divisional M42 battalion deployed in the air defense role. Lacking a corps-level ADA group as a source of air defense control information, tie-in must be made to the area or regional air defense/air traffic regulation facility with equivalent area of responsibility, or to the nearest Hawk unit.

107. ADA AW In Nondivisional Vital Area Defense
(fig. 38)

a. Figure 38 depicts typical radio netting in a nondivisional (airbase, COMMZ, field army service area) vital area defense. A composite missile-AW defense is shown. Netting principles are the same in an all-AW defense.

b. The M55 elements are shown attached to other units, reflecting the normal deployment of

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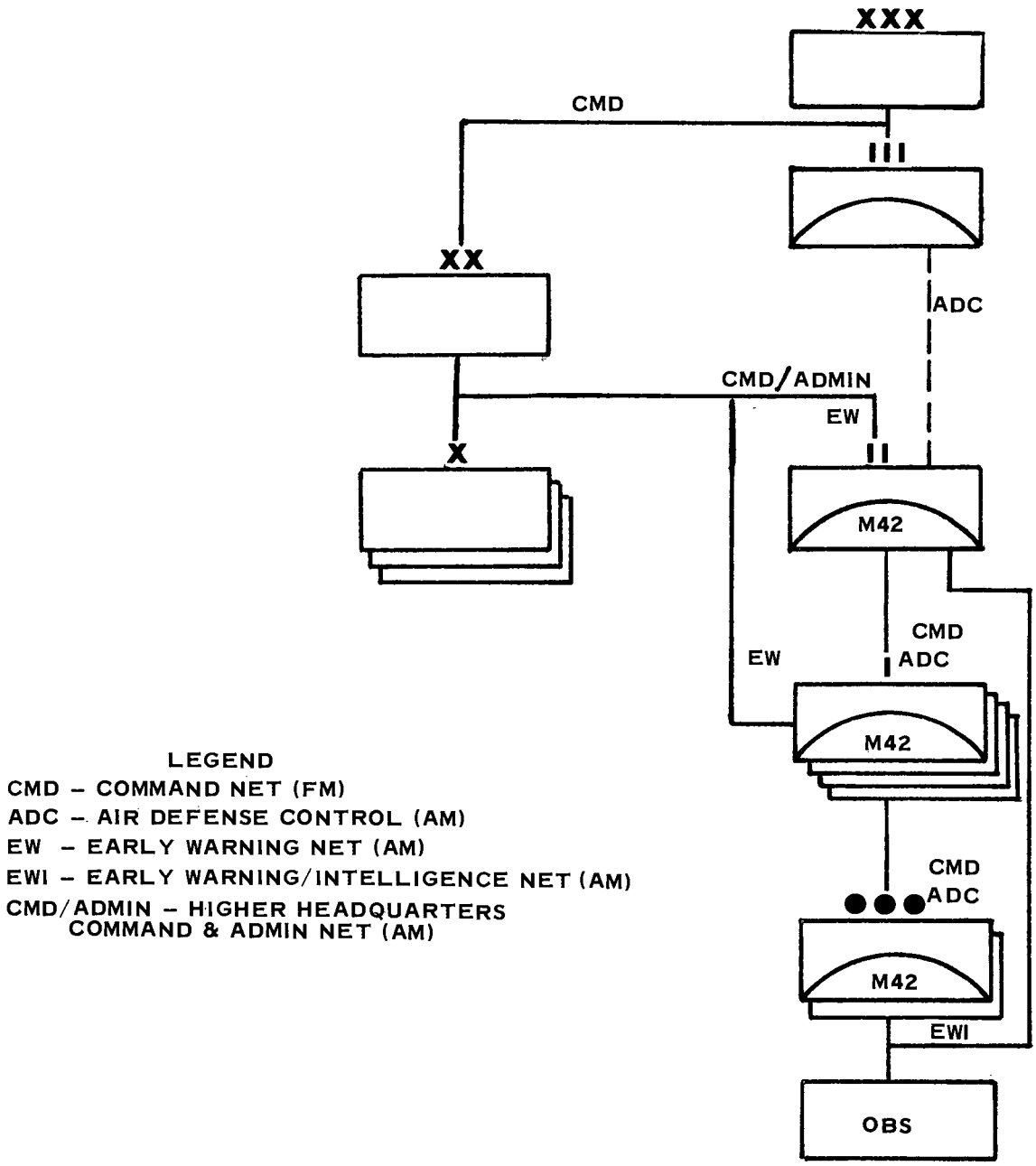

Figure 37. Radio nets, divisional ADA AW battalion (M42).

these weapons. In the situation shown, one and one-half M55 sections (6 weapons) are attached to each Hawk battery and deployed under Hawk battery control.

108. ADA AW Battalion (M42) in Support of Division Exploitation (fig. 39)

Figure 39 depicts two ADA AW batteries retained in an air defense role and two batteries attached to an exploiting brigade for ground

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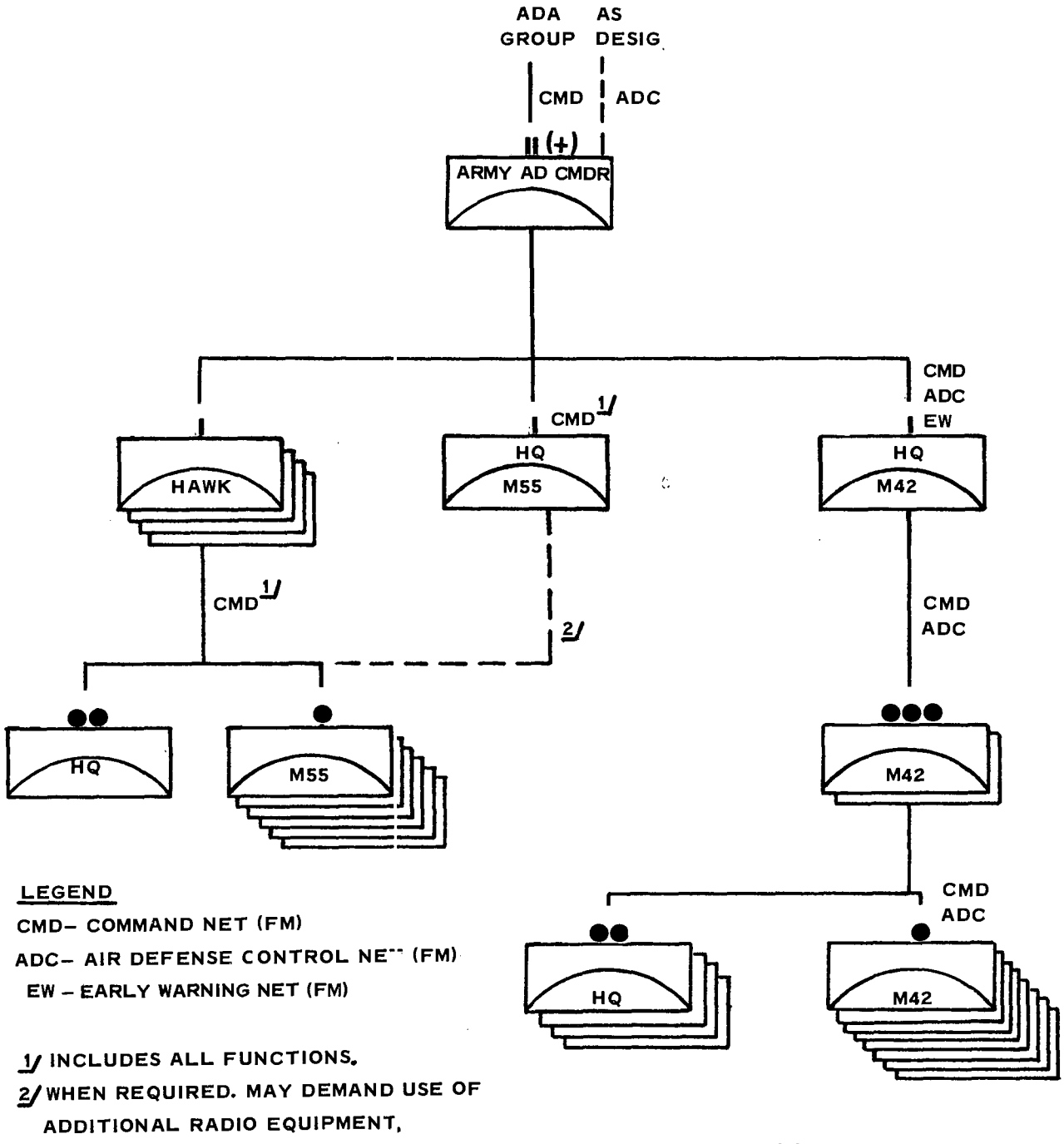

Figure 38. Radio nets, ADA AW units in nondivisional air defense

support. The batteries deployed in the ground support role should maintain communications with the ADA AW battalion, if possible, to preclude burdening the supported unit's communications nets with routine ADA-peculiar administrative and logistic messages. The air defense control net may be used for this function, provided its use for administrative matters is minimized. Use of this net in this manner serves the secondary purpose of keeping the attached ADA AW units abreast of the air defense situation.

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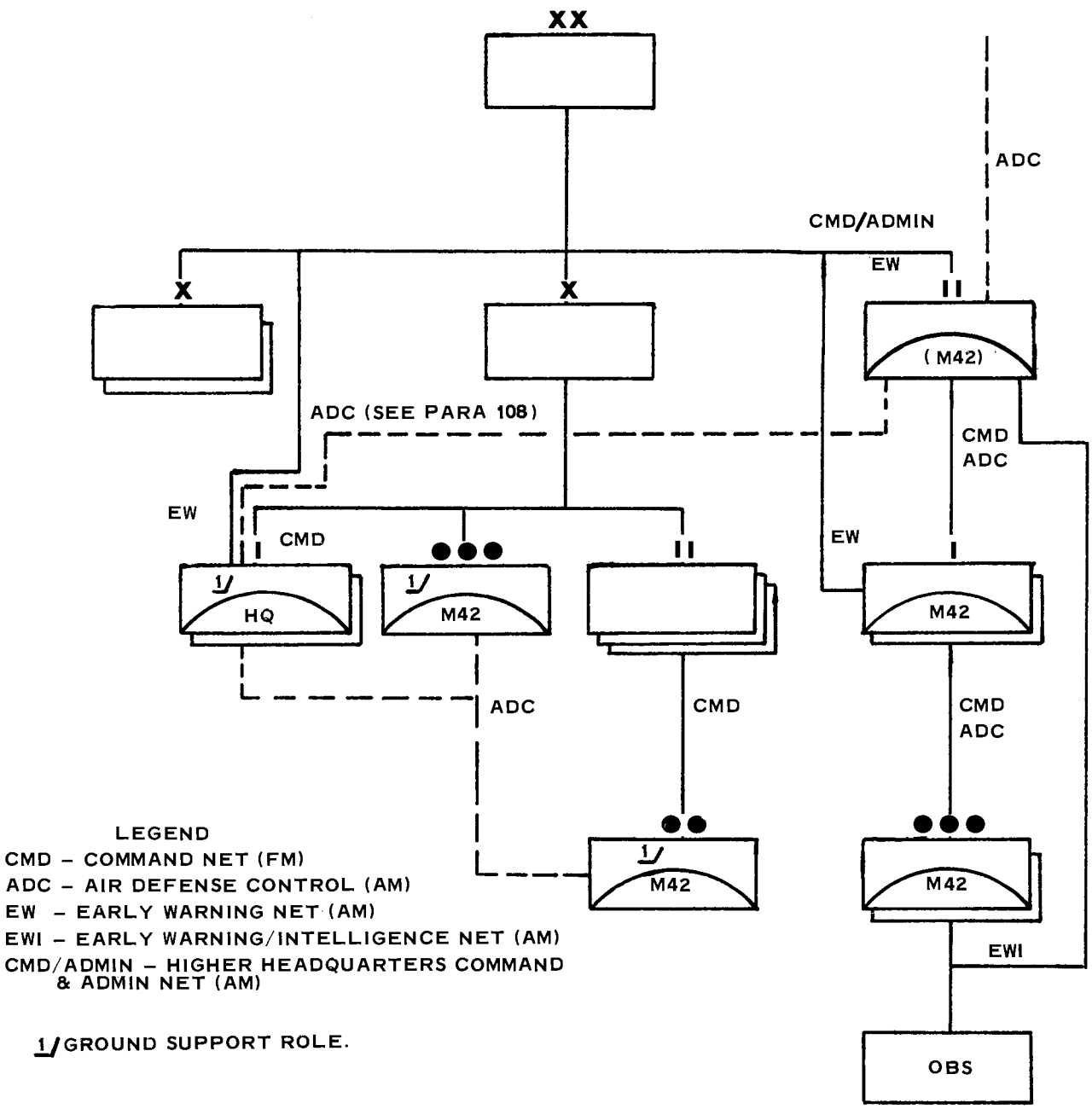

Figure 39. Radio nets, ADA AW during exploitation.

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CHAPTER 8

COMBAT SERVICE SUPPORT

Section I. GENERAL

109. Introduction

a. The combat service support functions discussed in this chapter include supply, maintenance, medical service, processing captured weapons, and prisoner of war evacuation. Other functions included in the definition of the term combat service support (AR 320–5) and of concern to the ADA AW unit commander are covered elsewhere in this manual.

b. Accomplishment of the ADA AW mission requires efficient combat service support elements as well as efficient combat elements. ADA AW commanders at all levels must anticipate their combat service support needs and know how to employ the combat service support system.

c. This chapter applies primarily to the M42 ADA AW battalion, which has an organic combat service support capability. M55 ADA AW units must rely for combat service support upon the unit to which attached.

110. Responsibilities

a. The ADA AW commander is responsible for all aspects of combat service support within his command. He must insure that his subordinate ADA AW elements receive the necessary combat service support.

b. The ADA AW battalion S4 insures that the maintenance and supply activities of the battalion are coordinated, flexible and immediately responsible to the requirements of subordinate units. He is responsible for maintaining a continuous logistical estimate of the situation, and for preparation of the logistic paragraph of operation plans and orders.

c. Direct and general support unit commanders are responsible for providing maintenance and supply support to ADA AW units.

Section II. SUPPLY

111. General

a. General supply procedures and definitions are contained in FM 100–10 and FM 101–10.

b. The ADA AW battalion supply and ammunition sections operate under the supervision of the S4. They provide the capability for drawing all classes of supply from supply points and for delivering these supplies to the batteries in most situations.

c. M42 automatic weapons batteries have a limited supply capability. M42 platoons have no organic supply capabilities. It may be necessary to attach supply vehicles and personnel from the battalion headquarters battery to these elements when they are attached to other units or deployed at considerable distances from the battalion headquarters. M55 batteries must rely upon the unit to which they are attached for supply and other types of logistical support.

d. When attachment or detachment is envisioned, ADA AW units will normally carry an initial supply of class I, III, and V supplies.

e. When required, helicopters or other aviation support should be provided to the battalion for timely movement of critical parts and ammunition.

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112. Acquisition and Distribution of Supplies

a. Class I Supplies.

(1) *Requests and requisitions.* The battalion S4 submits a periodic ration request (based on strength information provided by the adjutant) to the appropriate army supply point, or, if the battalion is assigned or attached to a division, to the division supply and transport battalion. The request may be placed by telephone, radio, teletypewriter, or other means, as prescribed. Normally, the ration request indicates only the unit designation, and type and quantity of rations desired.

(2) *Distribution.* Normally the battalion supply section obtains rations from the designated class I supply point. At battalion, rations are further broken into battery lots. Batteries may pick up rations at battalion or battalion may deliver rations to batteries.

b. Class II Supplies.

(1) *Requests and requisitions.* Elements of the battalion normally enter a combat theater with all authorized class II items, including repair parts. When a class II item is lost, damaged, destroyed, or worn out, the battery commander makes a request for replacement to the battalion headquarters by written message, wire, or radio. Class II requests (except for medical class II supplies) are consolidated for all units of the battalion, and placed on requisition by the battalion supply section. Medical class II requisitions are submitted by the battalion medical section to the supporting medical company. When a repair part is consumed, a replenishment part is requested by the communication section (for signal items), the radar section (for radar items), or the maintenance section (for other items). Those repair parts requested most frequently (except medical) normally are replenished by the responsible direct support company. Repair parts for medical equipment are provided through medical channels. Other repair parts may be requisitioned by the battalion maintenance section, radar section, and communication section, or furnished directly to the user by mobile repair teams operating in support of the battalion.

(2) *Distribution.* The ADA AW battalion obtains class II items from the prescribed class II supply point. These supplies are broken down into battery lots according to requests submitted by the batteries. Battalion may establish a supply point for issue of class II items; however, delivery to the batteries is the usual method. Ambulances or other evacuation vehicles returning from the clearing station will bring back medical class II supplies to the battalion aid station.

c. Class III Supplies.

(1) *Requests and requisitions.* No formal requisitioning procedure is established for class III supplies; however, battalion may require batteries to forecast requirements. When the battalion is planning an extended move, the S4 should inform the army support element of the division support command to insure timely availability of the necessary POL products. The battalion should compile and maintain usage factors as a basis for estimating requirements.

(2) *Distribution.* Battalion obtains class III supplies from the prescribed class III supply point, and delivers the supplies to the batteries.

d. Class IV Supplies.

(1) *Requests and requisitions.* A request for class IV supplies is handled essentially in the same manner as that for class II items. One difference is that requests for class II items are based on an authorized Department of the

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Army allowance, whereas class IV requests are for items not included in such prescribed allowance tables.

(2) *Distribution.* Battalion obtains class IV supplies from the prescribed class IV supply point, and delivers the supplies to the batteries.

e. Class V Supplies.

(1) *Definitions.*

(*a*) *Basic load.* The basic load is that quantity of ammunition authorized by the Department of the Army or the overseas commander to be carried by individuals, stowed on unit vehicles, or carried on the weapon system vehicles and by the battalion ammunition section. For ammunition fired from weapons, the basic load is expressed in rounds per weapon; for bulk allotment items such as grenades, mines, and demolitions, it is expressed in units such as "each" or "pounds." The basic load is calculated to give a unit sufficient ammunition to initiate and sustain combat until normal resupply can be effected. In addition, it provides a tactical reserve to meet emergencies such as temporary delay in replenishment or unexpected heavy expenditures. Whenever possible, the basic load should be kept intact through immediate replenishment as ammunition is expended.

(*b*) *Required supply rate.* The required supply rate is the estimated amount of ammunition required to sustain the operations of any designated force without restriction for a specified period. For ammunition fired from weapons, this rate is expressed as rounds per weapon per day; for bulk allotment items, it is expressed in the appropriate unit of measure per individuals, organizations, or vehicle per day. The required supply rate is computed on, or applied to, tactical weapons in combat and combat support units only. Required ADA AW supply rates are determined by the ADA AW battalion commander based on estimated requirements furnished by his battery commanders.

(*c*) *Available supply rate.* The available supply rate is the rate of consumption of ammunition that can be sustained with available supplies, as announced by the commander of the unit to which the ADA AW battalion is attached or assigned. This rate is flexible in that available supplies need not be distributed equally to subordinate units. Essentially, it is used as a control on the amount of ammunition which may be drawn and expended by a unit. The rate is computed on, and applied to, tactical weapons in combat and combat units only. The rate is expressed the same as required supply rate; i.e., rounds per weapon per day, or units of measure per organization, individual, or vehicle per day.

(2) *Requests and requisitions.* Elements of the battalion submit informal requests (telephone, radio, or written message) for ammunition by type and amount to the battalion S4.

(3) *Distribution.* When batteries are operating under ADA AW battalion control, their ammunition requests are received by the S4 and checked and recorded. An ammunition transportation request is prepared and vehicles of the ammunition section are dispatched to the division or army ammunition supply point. The ammunition transportation request is approved and authenticated by the ammunition supply point officer and ammunition is loaded and delivered to the battery which requested it.

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Section III. MAINTENANCE

113. General

The maintenance procedures outlined herein apply to all equipment found in the air defense artillery automatic weapons units.

114. Performance of Maintenance

a. ADA AW Unit Organizational Maintenance. Maintenance will be performed as close to the origin of failure as possible. At this level, maintenance is normally accomplished by the replacement of components, assemblies, subassemblies, selected repair parts, and adjustments and alinement.

b. Direct Support Maintenance.

(1) *Nondivisional unit.* Direct support maintenance for the nondivisional ADA AW unit will be provided by the responsible army direct support unit (DSU). These direct support units will carry maintenance floats to enable direct exchange of serviceable for unserviceable items. The responsible direct support unit will provide repair parts required for organizational maintenance. The movement of the ADA AW unit from one area to another will necessitate the lateral transfer of the direct support repair parts from the losing DSU to the gaining DSU. If the ADA AW unit is moved to an area where there is no gaining DSU, the repair parts, tools, and DSU personnel must be attached to the ADA AW unit to insure mission accomplishment.

(2) *Divisional unit.* Direct support maintenance and repair parts for ADA AW units attached to a division are provided by the division maintenance battalion.

(3) *Variations.* Whenever the direct support being provided on an area basis is not meeting the demands of the ADA AW equipment, or whenever the ADA AW unit is too remote or isolated to receive adequate support, a composite direct support team with appropriate personnel, repair parts, and tools should be improvised and attached to the ADA AW unit.

c. General Support Maintenance. General support maintenance units provide backup and overflow support to direct support maintenance units. They maintain items requiring general support maintenance and also perform direct support maintenance on items that exceed the workload capacity of direct support units. At the general support level, repaired items normally are returned to supply stocks.

Section IV. OTHER COMBAT SERVICE SUPPORT FUNCTIONS

115. Medical Service

The ADA AW battalion medical section furnished medical services to include attachment of aidmen to batteries; collection, emergency treatment and evacuation of patients; and supervision of sanitation for the battalion. The section consists of the following key personnel with duties as indicated:

a. The *battalion surgeon's* duties include keeping the battalion commander informed of the medical situation and supervising the treatment and evacuation of the sick and wounded in the battalion area. The battalion surgeon supervises the training, allocation, and employment of the medical section personnel.

b. The *section sergeant* assists the battalion surgeon in supervising the activities of the section. He also maintains necessary medical and administrative records.

c. The six *medical aidmen*, one of which normally supports each battery and two of which support headquarters battery, perform the following functions:

(1) Treat the usual sick-call cases, return-

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ing to duty those who require no further attention, and forwarding to the battalion aid station those who require additional treatment.

(2) Operate the battery aid station where casualties are kept under observation until evacuated by the battalion evacuation team. The aid station is located in the vicinity of the battery command post in order to utilize the communication facilities of that installation.

(3) Keep the battery commander informed concerning the medical status in the battery area.

(4) Keep the battalion surgeon informed of the medical status in the battery area, using messages transmitted through battery communication facilities or through the medical evacuation system.

(5) Recommend necessary sanitation measures for the battery and provide technical guidance to the vector-control detail (AR 40–578).

116. Processing of Captured Materiel

a. Captured materiel is tagged, collected, and evacuated in the same manner as salvage. Captured materiel is always reported to the next higher headquarters, where it may be a source of enemy information. Weapons and equipment that appear to be of new or unusual design are evacuated through intelligence channels.

b. Enemy weapons are used only in emergencies. When they are used, friendly troops are notified. This prevents the characteristic appearance and sound of such weapons from attracting friendly fire.

117. Prisoner of War Evacuation

Captured personnel are taken first to the battalion prisoner of war collection point where examination for information of immediate value to the battalion is supervised by the battalion S2. Further evacuation normally is accomplished using empty unit vehicles going to the rear for resupply.

118. Destruction of Supplies and Equipment

When capture is imminent, nonmedical supplies and equipment are destroyed to deny their use to the enemy. The decision to destroy equipment is made only on authority delegated by the theater commander. ADA AW unit SOP should include detailed destruction plans. Under the provision of the Geneva Convention, medical material and stores shall not be intentionally destroyed (FM 27–10).

Section V. EFFECT OF NUCLEAR, CHEMICAL, OR BIOLOGICAL WEAPONS EMPLOYMENT ON COMBAT SERVICE SUPPORT

119. General Considerations

a. Following a nuclear, chemical, or biological attack, ADA AW units are re-equipped and resupplied as soon as possible from the nearest available sources. However, commanders must be prepared to operate despite shortages until reconstruction is accomplished. Redistribution of supplies and equipment within the unit may be necesssary.

b. Medical self-aid is practiced in all units. Personnel requiring evacuation are taken to casualty collecting points, if established, or to the ADA AW battalion aid station where they are sorted before evacuation. Evacuation is a responsibility of the ADA AW battalion, or of the unit to which ADA AW elements are attached.

c. Battalion transportation is used for evacuation of patients and resupply on a priority basis; however, the accomplishment of the battalion mission must not be jeopardized. Unit and route priorities prescribed in operation plans are implemented. Only those vehicles engaged in damage control, evacuation, and tactical operations are permitted to enter the devastated area.

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d. Decontamination and repair activities are limited to those essential to continuing support of the battalion mission. Engineer equipment, such as waterpoint equipment, may be used to assist in decontamination. The following have high priority for decontamination: personnel; communication equipment; weapons and equipment; supplies; and evacuation facilities. The following have priority for repair and reconstruction: communication facilities; supply installations; field fortifications; and transportation facilities. Personnel should be familiar with field methods of decontamination as outlined in FM 21–40 and TM 3–220.

e. Unit commanders are responsible for damage control operations in their own areas. They insure that all measures possible are taken to minimize the effects of a nuclear attack, to include placing the unit evacuation and resupply capability where it will receive the maximum degree of protection from the terrain, and keeping all supplies mobile when possible.

120. Command Aspects

The senior individual in each unit retains or regains control of his unit as soon as possible so that he can continue on the assigned mission. Commanding officers estimate losses and report to higher headquarters. The S1 notifies the next higher echelon of personnel losses and makes arrangements to secure individual or unit replacements. Each battery reports radiation exposure of each platoon to the battalion headquarters for use in planning future operations.

121. Civil Affairs Aspects

Following a nuclear attack, distress among the civilian population may present serious problems. ADA AW commanders should take the actions necessary to insure continuity in the accomplishment of the mission. Routing of traffic to prevent congestion of vital areas, clearing of areas required for operations, and provision of security are some of the measures that may be required.

Section VI. TYPICAL COMBAT SERVICE SUPPORT SITUATIONS

122. General

The ADA AW battalion is a self-sufficient organization with organic administrative, maintenance, supply, communications, and medical personnel and equipment. The battalion can be fragmented to provide air defense and ground support fires in a variety of situations. The combat service support implications will vary according to the method of employment. The following paragraphs present type situations to illustrate the methods by which combat service support may be provided.

123. Divisional ADA AW Units

The ADA AW battalion may be attached to a division to provide air defense and/or ground support. The division commander may retain the ADA AW battalion as a self contained unit or further attach subordinate elements of the battalion to units of the division.

a. When operating as a battalion, the combat service support responsibility remains with the battalion. The battalion receives support from the division support command elements.

b. When the ADA AW battalion is deployed by attaching batteries to subordinate elements of the division; e.g., by attaching a battery to an infantry brigade, the battery with its organic mess and supply capability will receive all classes of supply through the division element to which attached.

c. The battery may be further fragmented by attaching platoons to elements of the division. In this case the unit to which the platoons are attached must provide mess facilities and transportation assistance for class II through V resupply. Since the ADA AW platoon has no organic support capability, it normally would be augmented with a track vehicle mechanic, an automatic weapons mechanic, and essential tools and repair parts from the ADA AW battery headquarters.

d. See paragraph 125*a*.

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124. Nondivisional ADA AW Units

a. The corps or army commander may employ intact ADA AW battalions or tailored ADA AW units to protect critical targets such as ADA missile units, airheads, airbases, supply depots, and bridges in the corps or army areas.

b. Where the ADA AW battalion is employed in the corps or army area, the logistic responsibility remains with the battalion. The battalion will receive all classes of supply and maintenance support from the army direct support units serving the area.

c. Battery size ADA AW units may be employed in a AW/SAM vital area defense. The battery in this situation will obtain all supply and maintenance support through the SAM battalion to which attached.

d. ADA AW platoons may be deployed to defend a nondivisional unit or priority target. In this case arrangements must be made with another unit in the area to provide mess facilities and, if possible, class III supplies. The unit may also be able to assist the ADA AW platoon in securing other classes of supplies. Additional vehicles and personnel may be attached to the platoon from its parent battery.

e. The ADA AW battalion or battery may be assigned a mission of defending an Air Force or Navy installation. In this case, arrangements will be made for the installation to be protected to provide the AD unit with class I and II supplies. Class II, IV, and V supplies will be obtained from the nearest army direct support unit.

f. When an ADA AW battalion, or any element thereof that has been a part of a STRAF unit, is deployed to an area where combat service support elements are not deployed, the ADA AW unit must be provided with a direct support maintenance capability commensurate with the mission. The capability should be provided by the army commander until such time that support capability has been established in the area of operations.

125. Other Situations

a. Whenever the ADA AW platoon is broken down into weapon sections or squads for independent operations, the complexity of combat service support increases. These elements have no organic support capability. In such cases the parent ADA AW commander and the commander of the unit which the element is defending must jointly evaluate and resolve the details of combat service support for these units. Provisions must be made for messing, supply, and maintenance support.

b. The ADA MG battery cal .50 has an extremely limited support capability. When attached to a unit it depends upon that unit for administrative, mess, medical, and all logistical support to include class I through V supplies.

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CHAPTER 9

ADA AW COMBAT OPERATIONS

Section I. GENERAL

126. Introduction

ADA AW unit employment is basically the same in offense, defense, retrograde, and special operations. The primary differences are changes in priorities required by the changing importance of various elements of the defended unit, and in the phasing of air defense artillery forces into special combat operations. When the combat operation is planned, the ground force commander assigns missions to the ADA AW elements. The mission of an ADA AW unit in a combat operation usually is expressed in terms of priorities for the assets to be defended. The assigned mission remains in effect until priorities change. If the defended unit or installation moves, the defending ADA AW elements move with it. When AD priorities for a combat operation have been established, the ADA AW commander coordinates his AD plan with the defended force commander. The ADA AW commander must insure that the ADA AW elements provide continuous air defense protection to the defended unit throughout all phases of the operation. Certain characteristics of the operation (e.g., the scheme of maneuver) may dictate modification of normal techniques of ADA employment; however, basic principles remain the same. The air defense commander must be familiar with the various tactical maneuvers associated with offensive, defensive, and retrograde operations described in the appropriate combat arms manuals. The employment of ADA AW in the ground support role is discussed in paragraphs 132 through 147.

127. Organization for Combat

a. AD Role. When ADA AW units are assigned an air defense mission, they normally remain in the air defense chain of command. The attachment of an ADA AW element to a defended force is recommended only when a parent ADA AW unit cannot exercise tactical control or provide combat service support (ch. 3 and 8).

b. Ground Role. ADA AW units assigned a ground support mission normally are attached to the supported forces. These units are most suitable for employment with infantry elements opposing other infantry forces. The characteristics of ADA AW units limit their effectiveness in ground support of, or against, armored forces (para 132–147).

Section II. PRIORITIES

128. Establishment of Priorities

a. General. Priorities for assets to be defended are established by the ground force commander. Allocation of air defense means is recommended by the appropriate ADA AW commander. Priorities may vary depending upon the type operation supported.

b. Offensive Operations. Typical air defense priorities during the offense may include the following:

(1) Main effort.
(2) Nuclear delivery means.
(3) Reserve assembly areas.
(4) Surface-to-air missile systems.
(5) Bridges, road junctions, and critical terrain features.
(6) Command posts.

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c. Defensive Operations. Since an attacking enemy normally will be supported by tactical air forces before or during the attack phase, ADA AW units should be positioned to defend the division installations or units most essential to the division defensive plans. Typical air defense priorities during defense may include the following:

(1) Reserves (especially in a mobile defense).
(2) Nuclear delivery means.
(3) Surface-to-air missile system.
(4) Bridges, critical road junctions.
(5) Command posts.

d. Retrograde Operations. Air defense priorities during retrograde operations are similar to those in defensive operations (*c* above); however, certain portions of the withdrawal lines of communications (e.g., bridges, road intersections, and defiles) may become more important and the force commander may elect to change priorities for air defense when the transition to retrograde movements occurs.

Section III. SPECIAL OPERATONS AND ENVIRONMENTAL CONSIDERATIONS

129. General

Special operations and operations conducted under extreme terrain or weather conditions may influence the techniques of ADA AW employment. However, the fundamental principals of employment remain valid. This section discusses the application of these principles to special situations and the modification of techniques required to fulfill the assigned missions.

130. Special Operations

a. General. Special operations are those military operations which require specialized troops, equipment, or techniques. The successful employment of ADA AW will depend upon the timing, coordination, and proper exploitation of ADA AW unit and weapon capabilities. The special considerations in these operations are concerned mainly with training, deployment, and frequent changes in missions.

b. Plans and Estimates. The nature of special operations requires particular emphasis on accurate estimates, thorough planning, and a high degree of training and coordination. All ADA commanders involved in these operations must insure that plans provide for proper phasing of ADA into and during the operation. Estimates of the air threat may have to be revised since special operations may result in increased hostile air activity. In preparation of plans and estimates, particular consideration should be given to the following:

(1) Plans should provide for contingency actions to compensate for inaccuracies in initial estimates regarding enemy forces, terrain, and weather.

(2) Special operations may involve a joint task force structure. This emphasizes the need for effective coordination and liaison before and during the operation.

(3) Preparatory training must emphasize the operation, care, and maintenance of equipment under the expected conditions of terrain and weather, the use of special equipment, possible deviations from SOP, and familiarization with any special terminology connected with the operations.

c. Amphibious Operations (see FM 44–1 and FM 31–12). M42 and M55 ADA AW units are adaptable to amphibious operations. Air defense of the objective area is initially provided by shipborne air defense fires and by aircraft operating from carriers and/or from land bases within aircraft range capabilities. These forces are controlled by the amphibious task force commander. Army ADA AW forces are landed as early in the assault as the situation permits. Their landings are phased to coincide with the buildup of air defense priorities ashore, to facilitate the smooth transfer of the air defense control to the landing force commander which normally occurs after the task force beachhead has been secured, and to assure a continuing land-based air defense capability after the task

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force as such has been dissolved. Army air defense artillery forces ashore and operational in the AD role prior to the transfer of control to the landing force commander are controlled by naval control facilities afloat.

(1) The land force commander may desire to exploit the relatively short march order and emplacement times of ADA AW squads by deploying them before more sophisticated radar directed ADA systems are landed and emplaced. The ADA AW units may subsequently deploy inland to defend priority targets as they develop.

(2) Air defense priorities permitting, the land force commander may elect to exploit the firepower and mobility of ADA AW by employing them in a ground support role; e.g., as a part of assault reinforcing elements. When so used, attachments are made prior to embarkation. Commanders are cautioned against employing ADA AW units during the initial assault except under exceptional circumstances.

d. River-Crossing Operations (see FM 44–1 and FM 31–60). A deliberate river crossing is a special operation which normally will require highly detailed AD planning. Bridge sites are particularly susceptible to air attack because of their static nature and importance, and ADA AW are well suited for the defense of these sites against very low level air attacks. There will be a general buildup of friendly forces and materiel resources on the near bank prior to, during, and after the assault. This produces a variety of targets subject to air attack. March columns, road nets, assembly areas, forward deployed field artillery units, engineer units and equipments, and other combat service support resources are competitors for the defense provided by ADA AW units. The number and disposition of these assets complicate the allocation and deployment of ADA AW units. Consideration should be given to combining or grouping these assets for protection by ADA AW units; e.g., ADA AW squads might be deployed along and/or within a low level air approach and simultaneously protect a road net, assembly area, and march columns as they pass over the protected road net. As soon as the situation permits, ADA AW units should be phased over the crossing sites and employed in like manner on the far banks. ADA AW squads deploying forward should be prepared to take up temporary firing positions until better sites are reconnoitered. ADA AW units assigned AD missions usually do not displace to the far bank with assault echelons, but with fire support or subsequent echelons. The use of smoke during crossing operations may adversely affect the employment of visually directed AD weapons, but may enhance deployment plans. However, caution must be exercised before assuming that smoke will adequately hide a priority target and release a ADA AW unit for some other commitment. The number of AD priorities normally can be expected to rapidly exhaust ADA AW resources and thereby preclude employment of them in the ground support role. If ADA AW units are to be employed in a ground support role as a part of the assault force, exploiting force or reserve force for mopping up operations, it is likely that ADA AW units will join such forces from AD positions in the vicinity of crossing sites. Careful planning and coordination must be accomplished prior to attachment to insure a smooth and effective transition. ADA AW operations during river crossings are quite similar to those of amphibious operations. The main difference is the ADA AW units usually are actively engaged prior to the assault across a river. This complicates preparation in general, reduces time for planning, coordination, and training, and degrades air defense while units are displacing forward and emplacing on the far bank.

e. Counterguerrilla Operations (see FM 31–16). Guerrillas may be encountered in the rear areas of a force conducting conventional military operations and/or in an insurgency environment. Units or installations defended by ADA AW, and the defending ADA AW units are prime targets for guerrilla forces. Under these circumstances, ADA AW units must be prepared for ground attack at any time. Local security measures must be emphasized and receive constant attention. Alternate positions are

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selected and randomly occupied. Supplementary firing positions are prepared for rapid occupation in the event that effective ground fires from AD positions are impossible. The local security measures of the ADA AW unit are integrated with those of the defended and adjacent units. If employed in a ground support role, ADA AW may be included as part of a combined arms counterguerrilla force. With the possible exception of acting as a mobile reserve, ADA AW units are not used alone for counterguerrilla operations. During counterguerrilla operations, ADA AW units may be concerned with civic action programs designed to win the support of the civilian population.

f. Airmobile and Airborne Operations.

(1) *Characteristics of airmobile and airborne operations.*

(*a*) Airmobile operations usually are executed in lightly defended areas or after a preassault nuclear or nonnuclear preparation with the advantage of initial tactical surprise.

(*b*) Airborne operations normally require multiple dispersed marshalling camps, airfields, and air landing facilities in the departure area. The number required and degree of dispersion is dependent upon the enemy capability to interfere with marshalling and takeoff. Drop zones and landing zones are required in the objective area. Sufficient air transport and tactical air support must be made available to insure successful movements of units and their equipment to the objective area, and to supply the force for the required length of time.

(*c*) Airmobile and airborne forces can land directly on, or adjacent to, their objectives.

(*d*) The types and amounts of heavy equipment that can be taken into the objective area are limited.

(*e*) Airmobile and airborne forces have the ability to conduct operations readily in otherwise inaccessible areas.

(*f*) Airmobile forces are particularly vulnerable to enemy air due to their limited ground mobility and firepower in the objective area.

(*g*) Airmobile operations require air superiority in the objective area and suppression of enemy ground fire.

(*h*) Adverse weather restricts airmobile and airborne operations more than it restricts ground mobile operations.

(2) *ADA role.* The role of air defense in airmobile and airborne operations is essentially the same as in other operations: to provide low altitude air defense protection for value targets. Since airmobile and airborne operations are similar to other ground combat operations, the fundamental principles of employment (para 36) apply. However, the techniques for implementing these fundamental principles differ from other ground operations due to the characteristics of airmobile and airborne operations. The unique requirement that equipment be helicopter-transportable and that some degree of ground mobility be retained places certain restrictions on ADA AW employment and organization in support of airmobile operations. Air defense elements supporting airborne operations must have the same degree of transportability and ground mobility as that of the defended units.

(3) *Special considerations.* In addition to the principles of employment discussed in chapter 4, the ADA AW commander with the mission of defending airmobile or airborne elements must consider the following in detail before formulating the AD plan.

(*a*) *Employment of ADA AW.* The M55 weapon system is suitable for airmobile operations since it is helicopter-transportable, mobile, and has a quick reaction time. These weapons should be allocated on the basis of four M55 batteries per air-

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mobile division. The M42, on the other hand, is not suited to airmobile operations primarily because it is not helicopter-transportable. Both the M42 and M55 are suitable for airborne operations. M55 fire units are air-transportable, air-droppable, mobile, and have a quick reaction time. They can be employed in any phase of airborne operations. M42 fire units are not air-droppable; they must be air-landed in the latter phases of airborne operations. For airborne divisions, the air defense weapons should be allocated on the basis of four M55 batteries or one M42 battalion.

(*b*) *Priorities.* Air defense priorities are established by the airmobile or airborne force commander. Typical priorities are—

1. Landing zone and assembly sites. Airmobile and airborne forces are particularly vulnerable during landing and assembly. ADA AW units complement tactical air force protection in defending airmobile and airborne operations during this critical phase.
2. Nuclear delivery units.
3. Maneuver units.
4. Logistical complexes.
5. Command posts.

(*c*) *Training.* ADA AW personnel must be thoroughly trained in techniques of airmobile and airborne operations applicable to air defense artillery.

(*d*) *Organization for combat.* Whenever possible, ADA AW units remain in the air defense artillery chain of command. If elements of an airmobile or airborne division are involved in deep penetrations or assault operations and the air defense chain of command cannot effectively control and support the ADA AW units, attachment to an airmobile or airborne force element is justified.

(*e*) *Control.* Control of ADA AW fires in airmobile and airborne operations should be by SOP. Although the ADA AW unit is governed by the area air defense commanders rules for engagement and action status, special tactical control measures are not required for ADA AW units when they are operating over extended lines of communication or cannot communicate with the ADA chain of command. The "right of self-defense" rule permits engagement of hostile aircraft even if the ADA AW unit cannot communicate with the air defense chain of command.

(*f*) *Deployments.* The principles of defense design (ch 4) are applicable. Particular attention must be given to balanced defense if the location of the airmobile or airborne assault permits hostile air attack from any direction.

131. Environmental Considerations

a. General. Terrain and weather can adversely influence ADA AW operations. In most instances, problems can be anticipated and overcome by applying sound judgment.

b. Effect of Environment. Jungle, mountain, desert and arctic operations present special problems because of extremes in terrain and weather. These conditions degrade weapon capabilities and intensify limitations. Measures must be devised to minimize the effect of these adversities (see FM 44–1).

(1) *Jungle* (see FM 31–30). The jungle and other areas of dense vegetation restricts mobility and fields of observation and fire, degrades tactical control, and complicates maintenance and supply to the point where the use of ADA AW units in primary jungle areas may be impractical, if not impossible, in either the AD or ground support role. Use is restricted to the relatively open areas contiguous to or within the jungle, such as grasslands and

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cultivated areas. In these areas, ADA AW units may also be used to provide air defense of airfields, railroad yards, towns and villages, and combat bases. Constant emphasis must be placed upon local security and integration of the ADA local security plan with that of the defended or adjacent unit or installation. ADA AW units may be particularly valuable for employment as a part of mobile reserves to counter ambushes or attacks in and around large installations if the air threat and terrain permit. Consideration should be given to providing infantry elements to ADA AW units when they are required to move through jungle.

(2) *Mountains* (see FM 31–72). Mountains degrade mobility and tactical control, restrict fields of observation and fire, limit the number of suitable firing positions available, and complicate supply and maintenance. Balanced air defenses are seldom achieved and ADA AW units usually must be weighted along avenues of approach. RSOPs can be expected to consume extensive periods of time. Protection of march columns and road nets takes on an added significance. Infantry plays the dominant role in mountain operations but, except for special purposes, ADA AW elements are not normally assigned ground support missions for the infantry. ADA AW units are more suited to the air defense of armor, artillery, and combat engineer units in mountain operations.

(3) *Desert* (see FM 31–25). Sand, rock, dry climate, lack of vegetation, and temperature extremes are common characteristics of desert areas. Intensive maintenance is required to protect materiel from the abrasive action of dust and sand. Combat readiness depends upon the effectiveness of a realistic maintenance program. Natural cover and concealment is scarce, and imaginative passive air defense measures are required. The tracked mobility of the M42 is particularly suited to desert operations.

(4) *Cold weather* (see FM 31–70). The effects of cold weather upon personnel and equipment must be minimized in order to conduct successful operations. In cold weather operations, personnel must expend considerable time and energy in self-preservation, and the efficiency of personnel in the operation and maintenance of equipment is reduced accordingly. Efficiency is further reduced by the bulk and clumsiness of cold weather clothing. Nevertheless, all prescribed maintenance must be accomplished. Special care must be taken to insure that all adjustments are performed properly and that proper fuels and lubricants are used. Special winterizing equipment (personnel and powerplant heater kits) should be available and used. Personnel must be familiar with the effects of cold weather on metals, rubber, canvas, glass, gasoline, oils, grease, leather, paint, and upon their individual and crew-served weapons. They must know how to compensate for these effects. In cold weather, primary weapons operate sluggishly and have a high rate of breakage and malfunction. These problems can be minimized by—

(*a*) Keeping working parts as free of snow and ice as possible.

(*b*) Firing weapons at a reduced rate until parts have warmed up.

(*c*) Carrying additional spare parts on or with each weapon.

(*d*) Training personnel in probable causes of stoppages and the application of immediate action.

(*e*) Moving weapons to alternate positions to escape the effects of ice fog after firing.

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Section IV. GROUND SUPPORT ROLE

132. Basic Concepts

a. The primary mission of the ADA AW unit assigned a ground support role is to provide fire as directed by the supported force commander.

b. The ADA AW unit's mobility and communications enable it to be redeployed rapidly in response to changing tactical situations. If AD fire from the ground support positions is not feasible, supplementary air defense positions in the vicinity of the ground support positions should be selected and occupied in the event of air attack.

c. Use of direct fire is normal; however, indirect fire may be used as necessary.

d. Mutual support between fire units and massing of fires should be sought.

e. The platoon is the basic ADA AW element employed in the ground support role. When employed in this manner, the platoon may be augmented by a portion of the ADA AW battalion combat service support capability. The augmented platoon is then attached to the supported force; e.g., an infantry battalion.

f. ADA AW sections, squads, or tailored organizations of less than platoon size may be further attached to subordinate elements of the supported force. These units are dependent upon elements of the augmented platoon and the supported force for combat service support.

g. ADA AW commanders whose ADA AW squads have been attached to other units perform advisory, support, and planning functions as outlined in paragraph 21.

h. This section pertains only to M42 ADA AW units. The M55 ADA AW unit's limited ground mobility and organizational limitations prevent its use in ground support of maneuver elements, as discussed in paragraphs 3 and 5. This does not preclude maximum integration of M55 firepower into the local security plans of the defended unit or installation.

133. Capabilities and Limitations

a. M42 ADA AW squads are capable of delivering a high volume of accurate direct fire against enemy personnel, lightly armored vehicles, bunkers, observation posts, crew-served weapons, and similar targets. Indirect fire also may be used, although it is less effective and is worthwhile only in a rather narrow range of circumstances. Specific capabilities are presented in paragraph 4.

b. Limitations of the M42 ADA AW in the ground support role include its high silhouette, lack of overhead crew protection and ineffectiveness against heavily armored vehicles. Due to these limitations, M42 ADA AW must not be employed in a tank role of self-propelled antitank weapon.

134. Mission

When the ground threat exceeds the air threat or as the force commander elects, the force commander may elect to exploit the mobility and firepower of infantry elements opposing infantry elements. See paragraphs 3 and 5 for further discussions of ADA AW missions.

135. Organization for Combat

a. The ADA AW unit normally is attached to a combat unit when assigned a ground support role. A typical attachment is the ADA AW platoon (8 AW squads) attached to an infantry battalion. The supported battalion commander may then further attach ADA AW sections to his companies, or assign some ADA AW elements the mission of providing local security or air defense for the battalion reserve until the reserve is committed. In any arrangement, the ADA AW platoon commander is the principal advisor to the supported unit commander regarding the technical and tactical capabilities of the weapon. He must remain abreast of combat operations and the performance of his sections and squads.

b. The ADA AW platoon organization for performance of the ground support role is tailored to consist of the basic platoon (para 11), augmented by a portion of the ADA AW battalion and/or battery combat service sup-

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port capability as discussed in chapter 8. Combat service support responsibilities of the attached ADA AW unit, the supported unit, and the parent ADA organization must be specified in the attachment order.

136. Duties of Key Personnel

a. Platoon Leader. The platoon leader is responsible for the platoon's training, employment, and combat service support. He receives his orders from the commander of the unit to which attached; e.g., an infantry battalion commander. He makes recommendations for the employment of his platoon. He selects and directs the preparation of firing positions and areas for any elements of his platoon which are not further attached to subordinate elements of the supported unit. He is considered a special staff officer under the supported unit's S3 staff supervision. The platoon leader normally remains with the supported force headquarters as the ADA AW special staff officer.

b. Assistant Platoon Leader. The assistant platoon leader is second in command and assumes command of the platoon in the absence of the platoon leader. He may provide the platoon liaison with the supported force when the platoon is deployed as a whole, or may be designated to command ADA AW sections or squads further attached to subordinate elements of the supported unit.

c. Platoon Sergeant. The platoon sergeant assumes command of the platoon in the absence of the platoon and assistant platoon leaders. He supervises the platoon transportation and resupply of ammunition and supplies. He may be designated to accompany a portion of the platoon on a mission in order to assist the squad leaders in matters of fire control and coordination with supported units. He may also command specified ADA AW sections and squads which have been further attached.

137. Communications

a. General. Chapter 7 describes basic communications nets.

b. Radio Communications.

(1) The vehicular radio mounted in the platoon leader's ¼-ton truck permits the platoon leader to operate in the ADA AW platoon command net and in another designated net, normally the command net, of the supported unit.

(2) The vehicular radio mounted in the platoon headquarters ¾-ton truck (AN/GRC–106) permits operation in the air defense control net (para 99 and 108) to preclude burdening the supported units communications nets with routine ADA-peculiar administrative and logistic messages. Use of the air defense control net in this manner also keeps the ADA AW platoon abreast of the air defense situation.

(3) The ADA AW squad vehicular radio operates in the ADA AW platoon command net when the squad is operating under platoon tactical control. When the squad is attached directly to a maneuver element, it may operate in that element's command net or may be directed to receive orders via the artillery forward observer net. The squad receiver-only radio (AN/GRR–5) normally is tuned to the division warning net frequency, although it may be tuned to other AM nets when required or directed.

(4) The ADA AW section leader utilizes a selected squad's radio for receipt and transmission of section command and control information.

c. Wire Communications. Each ADA AW squad and the platoon headquarters has wire and telephones to establish communication through the nearest switchboard. In addition, the platoon headquarters has a switchboard which enables the platoon to establish its own wire net when necessary.

138. Reconnaissance, Selection and Occupation of Position

Movement orders are received from the commander of the unit to which the ADA AW is attached. Upon receipt of these orders, the AD

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commander will conduct a reconnaissance, selection, and occupation of position to accomplish the ground support mission. RSOP procedures for this mission are presented in paragraphs 72 through 75.

139. Alternate and Supplementary Positions

a. An alternate position is one to which the squad moves when the primary position becomes untenable. The authority to occupy alternate positions is normally delegated to the squad leaders. See paragraph 48*b* for a discussion of alternate position requirements.

b. A supplementary position is a position for firing on targets which cannot be effectively fired upon from the primary position (para 48*c*). Movement to supplementary position is made on order of the unit commander to which attached.

140. Security

Squad leaders provide their own local security through utilization of crewmen not engaged in firing and handling ammunition, and by positioning their units within the security perimeter of the supported force (see ch 6).

141. Ammunition Resupply

a. Ammunition resupply is the responsibility of the commander of the unit to which attached. ADA AW unit vehicles and other vehicles designated by the supported unit commander may be used. The platoon attachment order normally provides ADA AW battalion vehicles to the platoon for use in ammunition resupply (see ch 8).

b. Resupply procedures are implemented as soon as possible after ammunition is expended. Vehicles delivering ammunition should be offloaded as soon as possible to allow return of these vehicles to the trains area.

142. Actions During Defensive Operations

a. The ADA AW platoon may support any one or any combination of the three echelons of defense: security force, forward defense force, and reserve force. When supporting the security echelon, ADA AW elements may be disposed with the security force to cover avenues of approach likely to be used by the enemy. When supporting the forward defense force, the ADA AW may be disposed to cover the most probable avenues of approach consistent with the capabilities of the weapons system.

b. The preferred employment for squads in both area and mobile defense is well forward, covering likely avenues of enemy approach. The elements of the ADA AW platoon may be attached to the companies in whose area they are operating. This includes employment on the combat outpost line (COPL) as required.

143. Actions During Retrograde Operations

a. General. ADA AW squads generally are attached to small maneuver units in a retrograde movement.

b. Night Withdrawal. Battlefield illumination is desirable to effectively employ M42 ADA AW at night. If squads have been attached to forward companies they normally remain with those companies during the withdrawal. In this way support is provided for the withdrawal of the main body. These squads may be further attached to the elements left in contact if illumination is provided and night employment is feasible. Plans for movement of the platoon (squads) must include measures to provide security and maintain secrecy.

c. *Daylight Withdrawal.* During a daylight withdrawal (under enemy pressure) squads remain attached to forward rifle companies. In this employment they reinforce company covering forces (usually reserve rifle platoon) with fires to aid disengagement of forward units. When the forward rifle companies withdraw through the battalion covering force, the ADA AW unit (or squads) may be attached to this force. This attachment reinforces the fires of the covering force and provides the supported commander with maximum support during a critical period.

d. Delaying Action. Supported units may fight delaying actions from a defensive position or from a delaying position. Based on the mis-

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sion (which normally directs a force to delay the enemy forward of a specified line while other rearward defensive preparations are made), the ADA AW squads are attached to the forward companies. As the frontages may be quite wide in a delaying operation, emphasis is placed on employing weapons from forward positions where they can place long-range fires on the enemy. Weapons are oriented astride the routes used by advancing enemy forces. Plans for ADA AW employment should include reconnaissance of routes of withdrawal and occupation of covering and blocking positions in the rear. This is especially true when the supported unit is attempting maximum delay on successive delaying positions. Squads may be leapfrogged from one delaying position to another to provide continuous support.

144. Relief Operations

a. General. During prolonged tactical operations, periodic relief of units may be required to conserve combat power, perform maintenance of equipment, or to prepare for subsequent operations. This may be accomplished by relief in place or a passage of lines.

b. Relief in Place. A relief in place in an operation in which a unit is replaced in a combat area by another unit. When a relief in place is effected between units defended by ADA AW, the ADA commanders involved must insure continuous fire support for their respective supported units. When a relief is effected between ADA AW units, the mission of the outgoing unit is assumed by the incoming unit. This requires thorough coordination between ADA commanders concerning disposition of friendly and hostile units, optimum weapon positions, and the exact time at which responsibilities are transferred. During the conduct of the relief, normal activities are simulated. The outgoing force furnishes security, fire support, and protection until the responsibility for the position has been exchanged between incoming and outgoing commanders. Often, heavier supplies and equipment are left on position. In the event of attack during relief, squads may be attached to the incoming force until such time as opportunity permits infiltration rearward.

c. Passage of Lines. Liaison is established between the ADA AW commanders of the "passing" ADA AW unit and the force which is being passed through. Information is exchanged and plans are coordinated. Communications are established to permit the passing force to coordinate ADA AW defense with the force being passed through during the critical phases of the passage of lines. Unless otherwise indicated in the operations order for the passage of lines, the ADA AW commanders of the "passing" unit and the force which is being passed through remain responsible for providing continuous fire support to their respective supported units.

145. Movement to Contact

a. When enemy contact is remote, the ADA AW platoon normally moves under supported battalion control. It is positioned within the battalion march formation to facilitate control and rapid deployment as required.

b. As the probability of contact increases the order of march assumes increased importance. Elements of the platoon should be relocated within the march formation to cope with enemy threats as they develop. Attachments may be made as necessary.

c. Throughout the movement to contact, the platoon leader and squad leaders plan for the squads to occupy positions from which they could cover the most dangerous avenues of enemy approach and best support the rifle companies.

146. Actions During Attack

a. When employed in the attack, the usual ADA AW mission will be fire support of committed forces. The ADA AW platoon (or elements of it) is employed initially from vantage points near or on the line of departure. Squads may remain in initial positions until they can no longer perform their mission or until their fires become masked by the attacking ground units.

b. The squads may have to displace to support a continuation of the attack or to support

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the consolidation on the objective. Displacement is not necessarily delayed until the squads can no longer provide effective support. Elements of the platoon may displace early to assist rifle units in repelling counterattacks.

c. Squads displace on order or by prearranged signal.The availability of new positions, routes forward, and the enemy threat influence the method of displacement. When displacement is by two or more squads, one squad retains the capability of continuing fire by remaining in the supporting position while the other squad(s) displaces.

d. Squads displace to positions previously selected by a visual or map reconnaissance. Upon arrival at the new position areas, the squad leader selects exact sites. Squads displace on order of the supported unit commander.

e. Plans are made for supporting the consolidation on objectives, and squads are positioned to cover the likely enemy approaches into the area. They occupy positions that will also support a contribution of the attack.

147. Pursuit

When the supported unit is engaged in a pursuit or exploitation, the squads normally are attached to an advance, flank, and/or rear guard. The pursuit or exploitation usually dictates decentralization of control and requires initiative and aggressiveness on the part of the platoon leader and the squad leaders. One or more squads may be attached to the lead company.

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APPENDIX I

REFERENCES

ACP 125	Allied Communications Procedures
AR 320–5	Dictionary of United States Army Terms
AR 320–50	Authorized Abbreviations and Brevity Codes
AR 385–63	Regulations for Firing Ammunition for Training, Target Practice, and Combat
DA Pam 108–1	Index of Army Motion Pictures, Filmstrips, Slides, Tapes, and Phono-Recordings
DA Pam 310–5	Index of Graphic Training Aids and Devices
DA Pam 310-series	Indexes of Military Publications
FM 3–5	Chemical, Biological, and Radiological (CBR) Operations
FM 3–10	Employment of Chemical and Biological Agents
FM 3–12	Operational Aspects of Radiological Defense
FM 5–13	The Engineer Soldier's Handbook
FM 5–15	Field Fortifications
FM 5–20	Camouflage, Basic Principals and Field Camouflage
FM 5–23	Field Decoy Installations
FM 5–35	Engineers' Reference and Logistical Data
FM 6–40	Field Artillery Cannon Gunnery
FM 6–140	Field Artillery Cannon Battalions and Batteries
FM 7–15	Rifle Platoon and Squads Infantry, Airborne, and Mechanized
FM 7–20	Infantry, Airborne Infantry, and Mechanized Infantry Battalions
FM 8–5	Medical Service Units, Theater of Operations
FM 8–10	Medical Service, Theater of Operations
FM 9–3	Ordnance Direct Support Service
FM 9–6	Ammunition Service in the Theater of Operations
FM 17–1	Armor Operations
FM 20–32	Land Mine Warfare
FM 21–11	First Aid for Soldiers
FM 21–26	Map Reading
FM 21–30	Military Symbols
FM 21–40	Small Unit Procedures in Chemical, Biological, and Radiological (CBR) Operations
FM 21–41	Soldier's Handbook for Chemical and Biological Operations and Nuclear Warfare
FM 21–48	Chemical, Biological, and Radiological (CBR), and Nuclear Defense Training Exercises
FM 24–1	Tactical Communications Doctrine
FM 24–19	Communications-Electronics Reference Data
FM 27–10	The Law of Land Warfare
FM 30–30	Aircraft Recognition Manual

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FM 31–10	Barriers and Denial Operations
FM 31–11	Doctrine for Amphibious Operations
FM 31–12	Army Forces in Amphibious Operations (The Army Landing Force)
FM 31–15	Operations Against Irregular Forces
FM 31–16	Counterguerrilla Operations
FM 31–25	Desert Operations
FM 31–30	Jungle Training and Operations
FM 31–60	River-Crossing Operations
FM 31–70	Basic Cold Weather Manual
FM 31–71	Northern Operations
FM 31–72	Mountain Operations
FM 44–1	U.S. Army Air Defense Employment
FM 44–7	Electronic Search Central AN/GSS–1 and Radar Sets AN/TPS–1D, 1G, and AN/TPS–36
FM 44–8	Army Air Defense Command Posts
FM 44–21	Antiaircraft Artillery Service Practice
FM 44–57	Service of the Piece; Multiple Caliber .50 Machinegun Motor Carriage M16A1, and Multiple Caliber .50 Machinegun Trailer Mount M55
FM 44–61	Service of the Self-Propelled Twin 40-MM Gun M42
FM 54–2	The Division Support Command
FM 57–35	Airmobile Operations
FM 57–100	The Airborne Division
FM 61–100	The Division
FM 100–5	Field Service Regulations—Operations
FM 100–10	Field Service Regulations, Administration
FM 101–5	Staff Officers Field Manual; Staff Organization and Procedure
FM 101–10	Organizational, Technical, and Logistical Data, Part I
JCS Pub 8	Doctrine for Air Defense from Oversea Land Areas
TM 3–220	Chemical, Biological, and Radiological (CBR) Decontamination
TM 9–500	Data Sheets for Ordnance Type Materiel
TM 9–1300–203	Ammunition for Antiaircraft, Tank, Antitank, and Field Artillery Weapons
TM 9–7218	Gun, Antiaircraft, Artillery, Self-Propelled: Twin 40-mm, M42 and M42A1

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APPENDIX II

STANDARDIZATION AGREEMENT

A standardization agreement (STANAG) is an international (NATO) agreement designed to facilitate inter-allied operations. Upon ratification by the United States, a STANAG is binding upon U.S. Army Forces either entirely or with exceptions. This appendix provides information of the STANAG implemented by this manual; it also lists other agreements of general interest to the users of this manual.

STANAG NO. 2047, "EMERGENCY WARNINGS OF HAZARD OR ATTACK" NATO UNCLASSIFIED DETAILS OF AGREEMENT

GENERAL

1. It is agreed that NATO Armed Forces when operating on land will use the sounds and signals detailed herein to give emergency warning of—

a. Biological, chemical or radiological hazards.

b. Air attack.

c. Ground attack.

2. The emergency warnings prescribed herein—

a. are designed for use *in a unit of battalion-size or smaller;*

b. are suitable for use in both forward and rear areas. With the exception of the Toxic Alarm System (STANAG 2004), no attempt has been made to make them coincide with wider warning systems such as may be used in civil defense;

c. are based on the use of distinctive sounds which can be produced in the field without special equipment or devices. Sirens will not be used to produce these emergency warnings;

d. should normally be supplemented by the simultaneous use of radio and telephones, particularly in the case of the all clear signal;

e. are limited in range and should be repeated swiftly throughout the unit area by all who hear or see the original warning.

3. Visual warnings are included in this STANAG to supplement the sound warnings under conditions when the latter may be lost due to other battlefield noises or to replace them when the tactical situation does not permit the use of sound signals.

4. This STANAG does *NOT* prescribe—

a. The defensive, evasive or other action to be taken in response to the emergency warnings. Such action should of course be covered in national instructions for operations and training.

b. The advance warnings which are required to alert friendly troops against the possible adverse effects of friendly strikes.

c. Supplementary warnings, e.g., pyrotechnics, which may be ordered by a commander for a specific operation.

DEFINITIONS

5. For the purposes of the STANAG the following definitions will apply:

a. Biological, Chemical or Radiological Hazards. The presence of biological or chemical agents or radiological particles in the vicinity of friendly troops, whether as a result of enemy or friendly action.

b. Air Attack. The direct attack on friendly troops by aircraft, or the imminent possibility thereof.

c. Ground Attack. Any attack in platoon strength or greater whether by infantry, ar-

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mored, amphibious or airborne troops into the sector (area) of a friendly unit.

d. All Clear. A signal given to indicate that the danger for which a warning has previously been given no longer exists.

SIGNALS

6. The signals used to give emergency warning of the types of hazards or attacks covered by this STANAG and the All Clear will be as follows:

Type	*Sound signal*	*Visual signal*
Biological, Chemical Radiological (dust) Hazard.	By percussion—rapid and continuous beating on any metal or any other object which will produce a loud noise, such as bells, metal triangles, iron railings, iron pipes, empty shell cases, mess tins, steel helmets, vehicle bodies, etc. (For further details on Toxic Alarm System, see STANAG 2004.)	Donning of the respirator and protective equipment followed by any agitated action to draw attention to the fact.
Air Attack	Continuous series of short blasts on a vehicle horn, whistle, bugle or other available wind instrument.	Rapid crossing and uncrossing of the arms fully extended above the head.
Ground Attack	Series of long blasts on a vehicle horn, whistle, bugle or other available wind instrument.	None—unless prescribed in national or local instructions.
All Clear	A continuous sustained blast on a vehicle horn, whistle, bugle or other available wind instrument.	None—unless prescribed in national or local instructions.

7. The signals listed above are primarily intended to serve as warnings of enemy action. They may also be used, however, in emergency when friendly action could produce similar effects on friendly troops.

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ADA Bn (5)
ADA Btry (1)
USMA (2)
Army Element, USSTRICOM (10)
USACGSC (5)
Br Svc Sch (5)

NG: State AF (3); TOE 44–2 (3); 44–8 (2); 44–12 (3); 44–85 (5); 44–87 (5); 44–112 (5).
USAR: Same as Active Army except allowance is one copy to each unit.
For explanation of abbreviations used, see AR 320–50.

☆U.S. Government Printing Office: 1966— O 217-543/7298A